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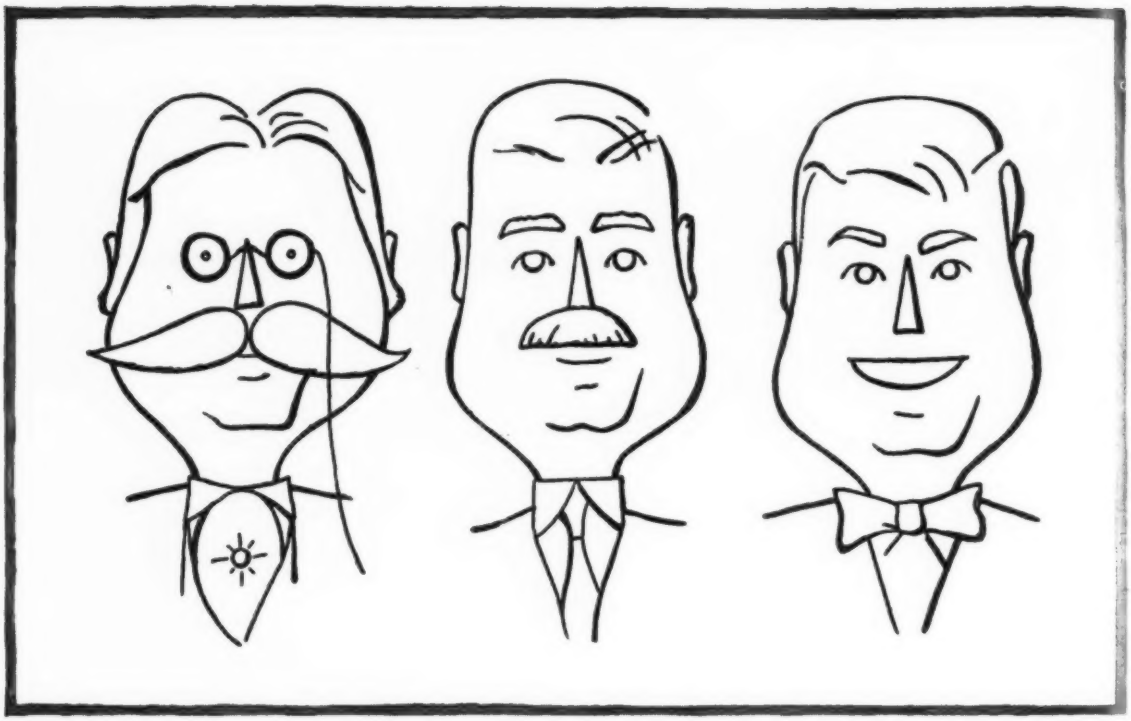

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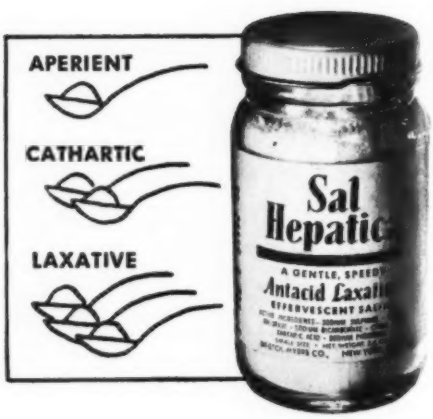

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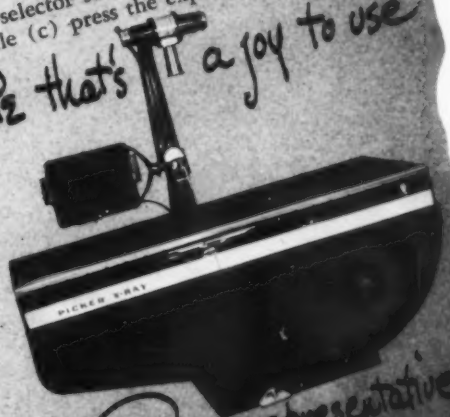

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Ford, R.V., and Moyer, J.H.: Am. Heart J. *46*:754 (Nov.) 1953.

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Finnerty, F.A., Jr.: Am. J. Med. *17*:629 (Nov.) 1954.

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Livesay, W.R., et al.: J.A.M.A. *155*:1027 (July 17) 1954.

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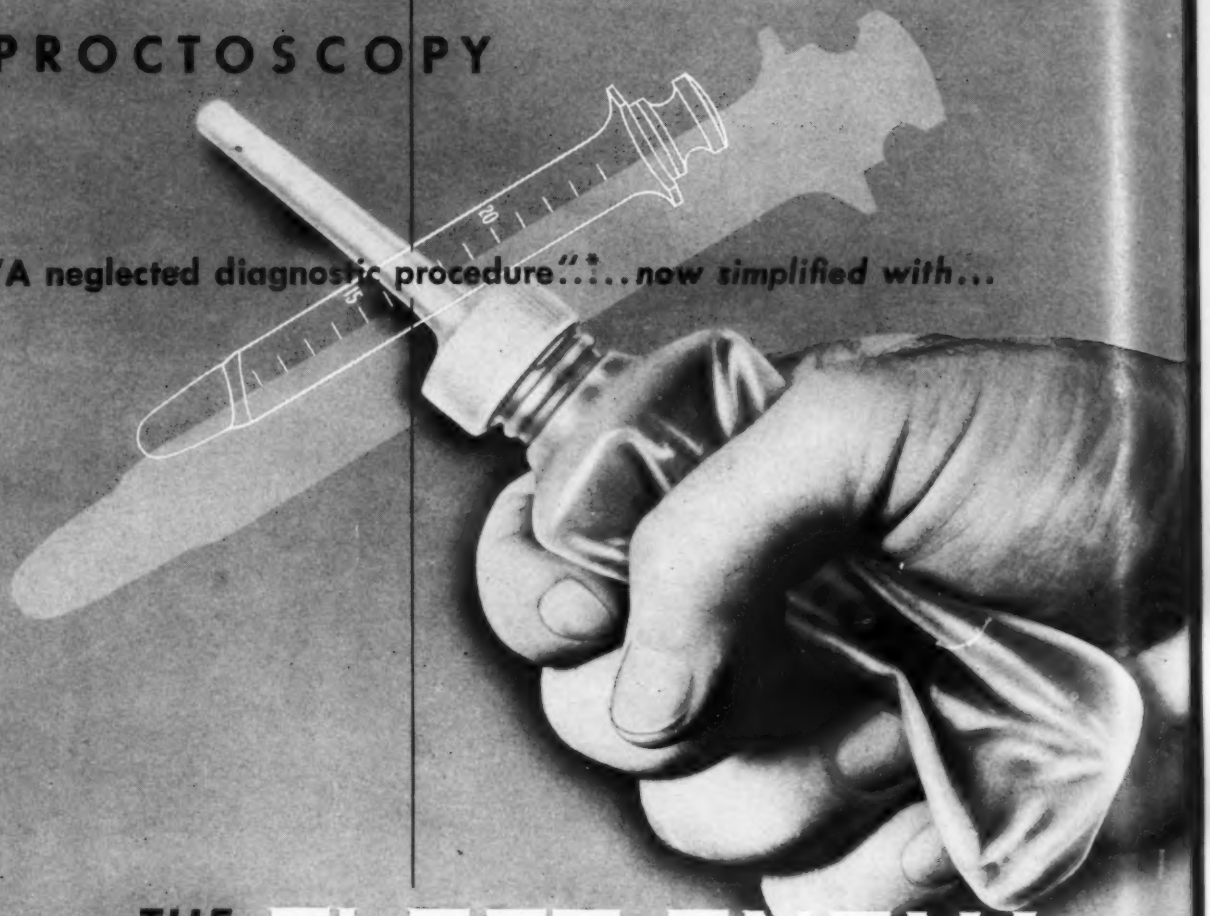

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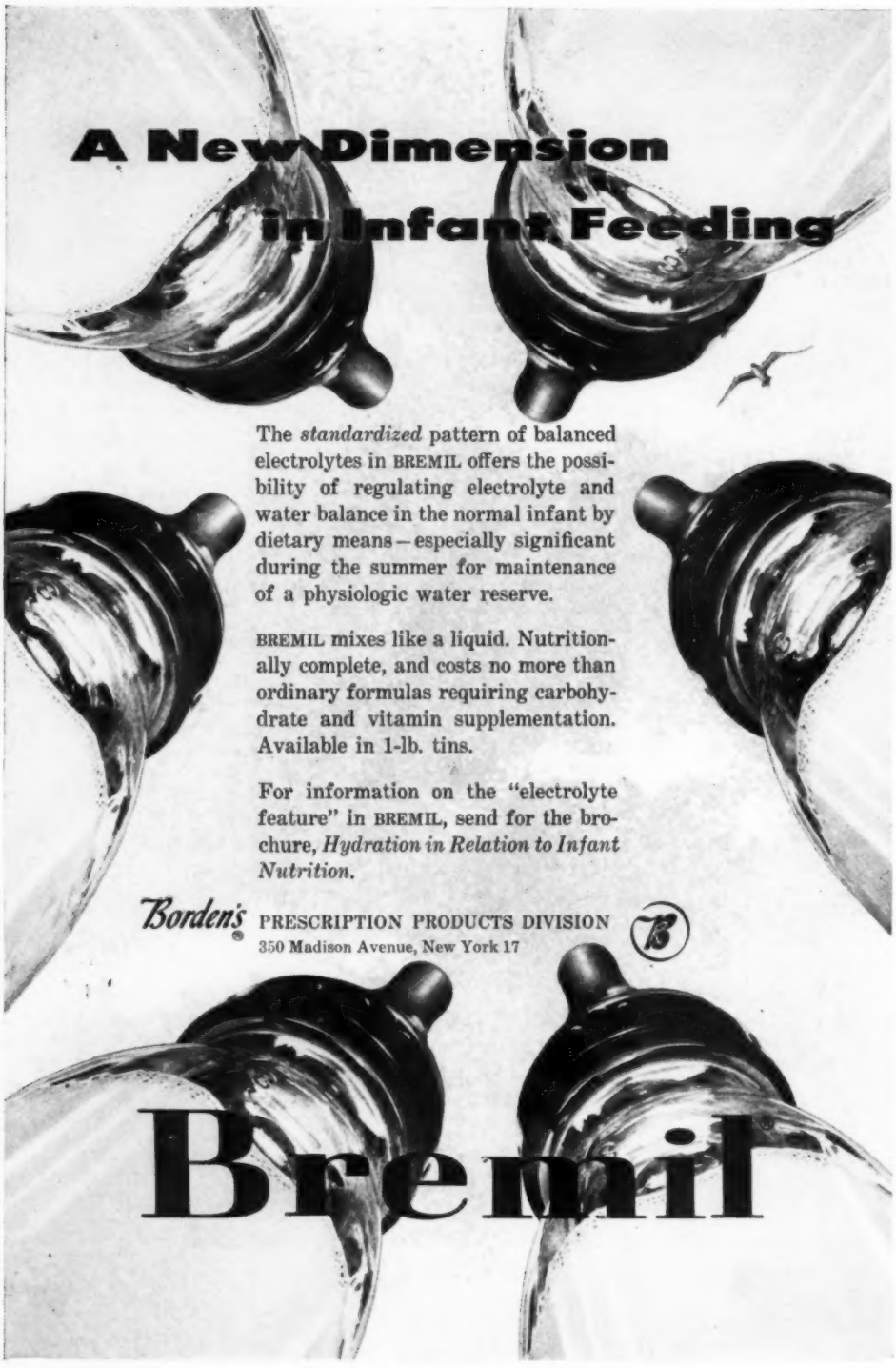
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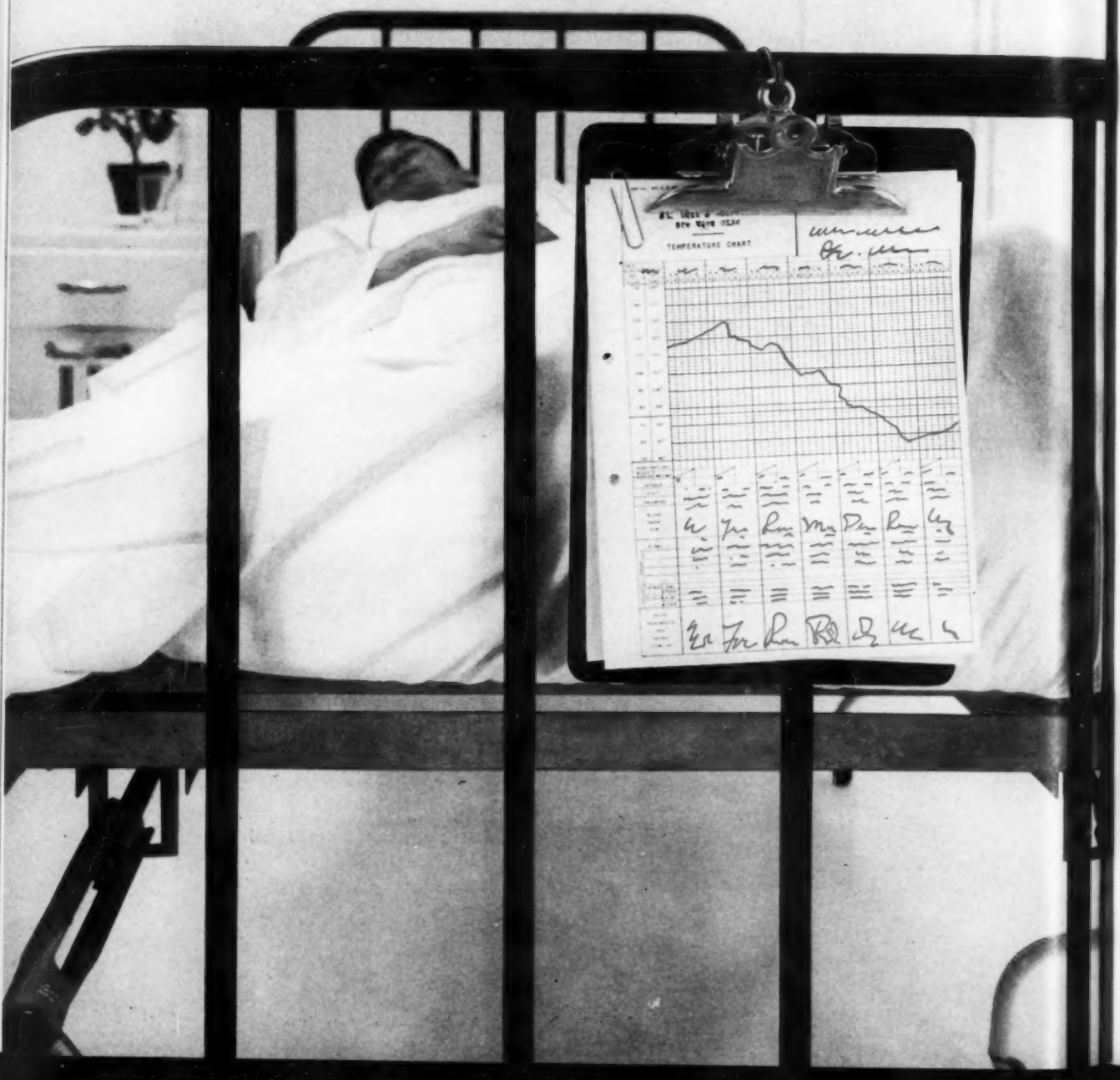

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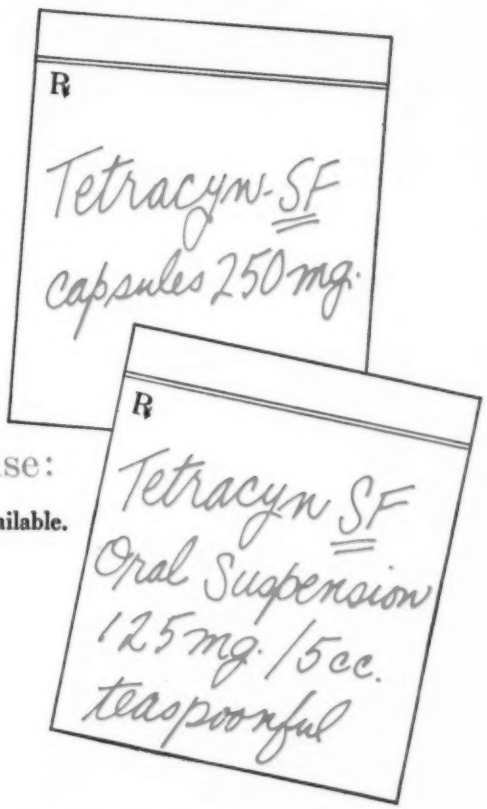

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2. Martí-Ibáñez, F: Antibiotic Med. *1*:247 (May) 1955.
3. Dumas, K. J.; Carlozzi, M., and Wright, W. A.: Antibiotic Med. *1*:296 (May) 1955.

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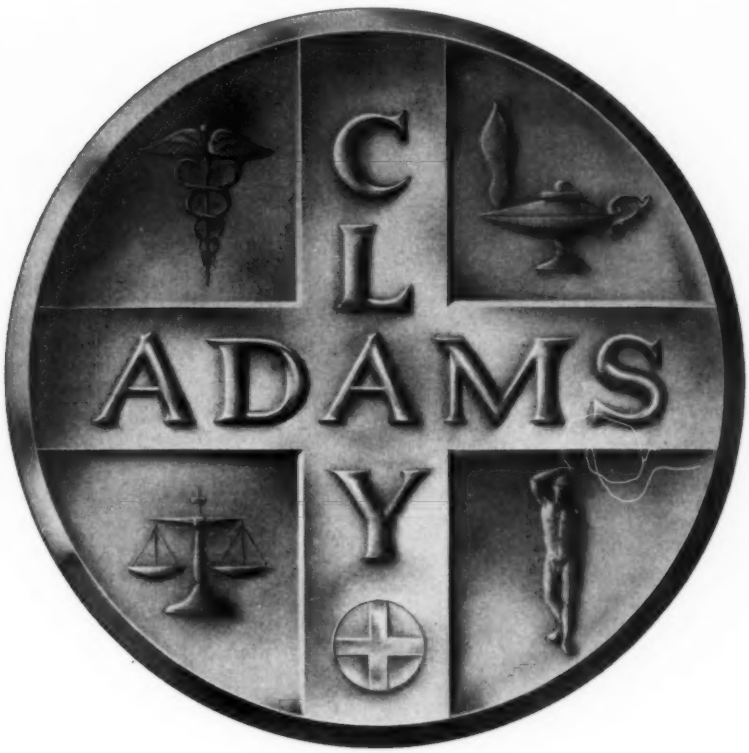

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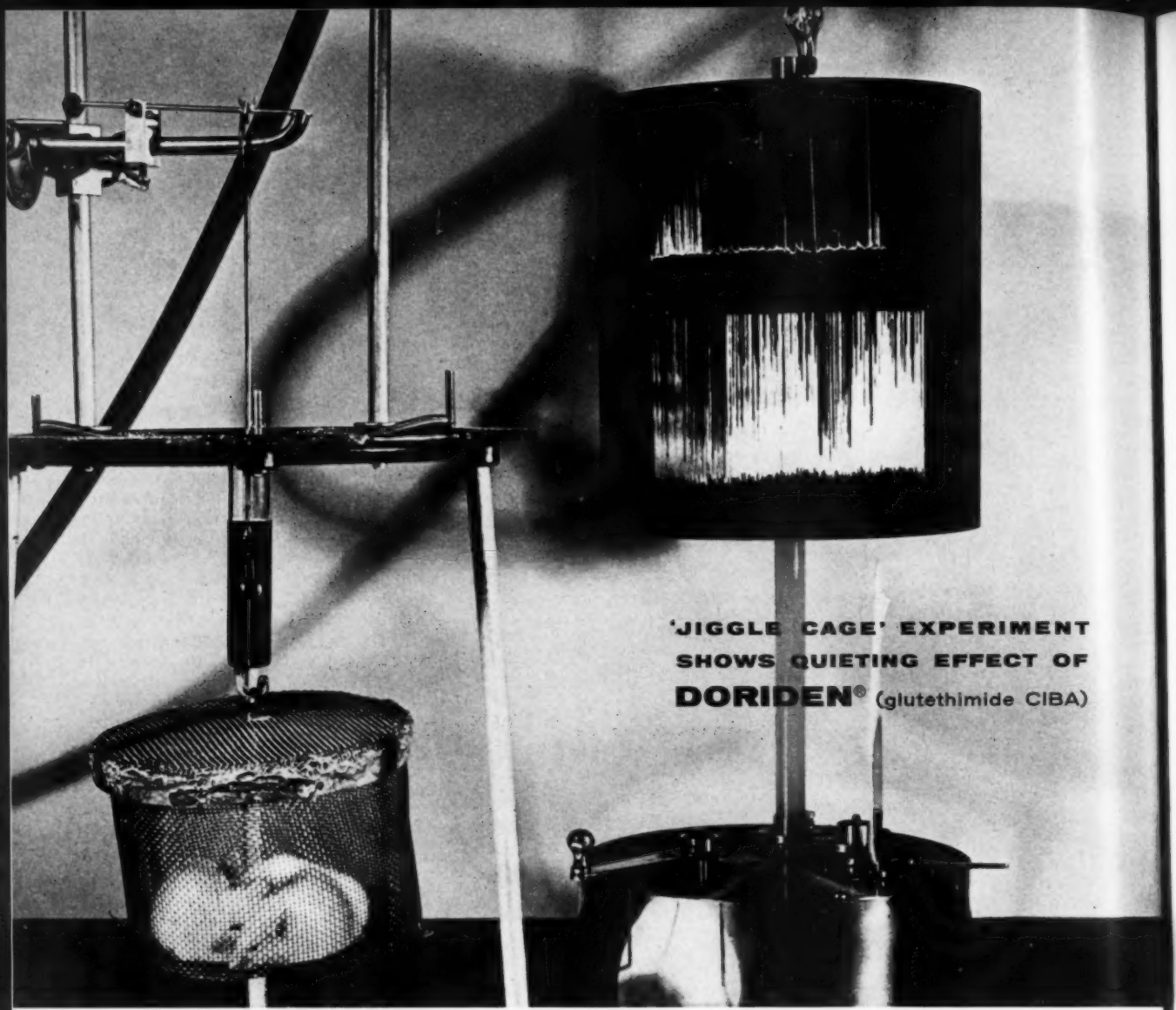
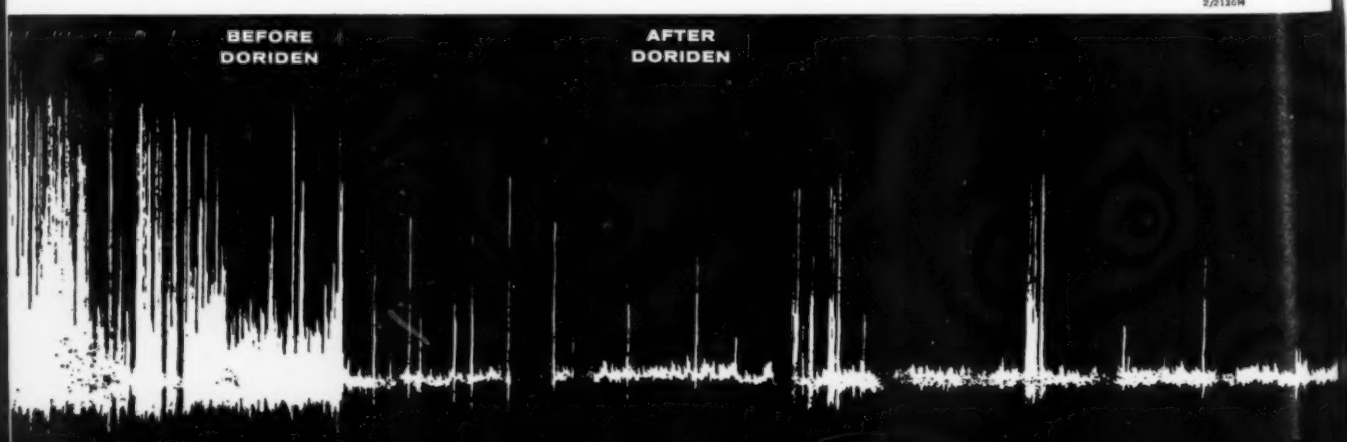
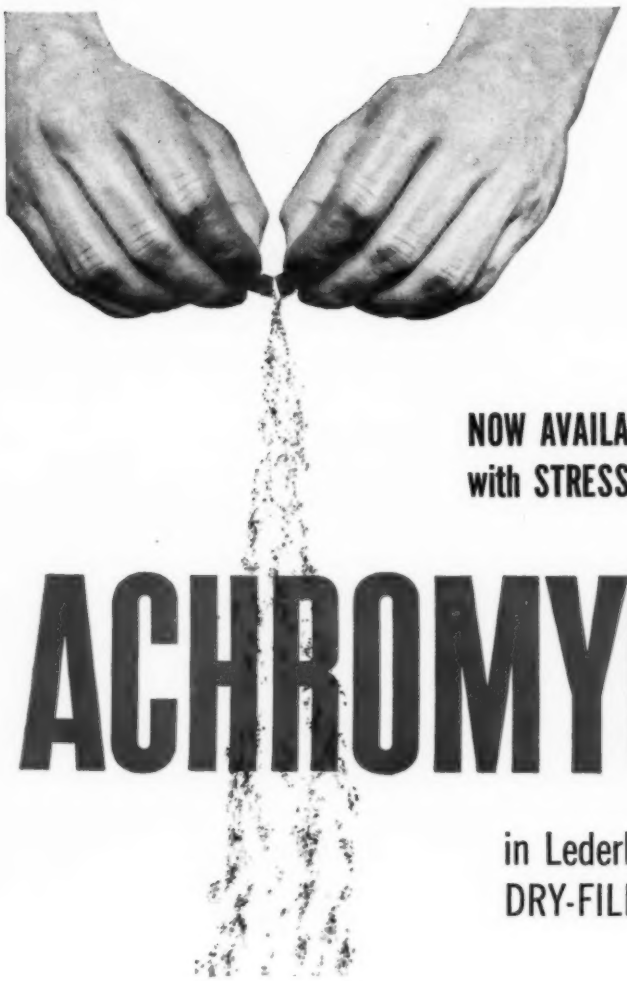


That **DORIDEN**—a totally new nonbarbiturate hypnotic and sedative—is effective as a quieting agent is demonstrated by this pneumatic movement recorder (jiggle cage), which measures the activity of laboratory animals. Note the marked change in the activity of mice after the administration of DORIDEN. Further evidence of the sedative and hypnotic effectiveness of DORIDEN is provided by numerous clinical studies. DORIDEN acts in 15 to 30 minutes and affords 4 to 8 hours of sound refreshing sleep. Present clinical evidence indicates it is not habit forming. *Tablets* (white, scored), 0.25 and 0.5 Gm. C I B A SUMMIT, N.J.

2/213GM





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ACHROMYCIN* SF

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in Lederle's EXCLUSIVE, DRY-FILLED sealed capsules

New ACHROMYCIN SF combines today's foremost broad-spectrum antibiotic with the stress vitamin formula suggested by the National Research Council. It provides, in a single dose, potent anti-infective action plus nutritional supplementation to hasten recovery and convalescence.

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When you want antibiotic therapy fortified with stress formula vitamins for patients with prolonged illness, prescribe ACHROMYCIN SF for prompt control of infection and maximum patient comfort.

Each capsule contains:

ACHROMYCIN Tetracycline Lederle	250 mg.
Ascorbic Acid	75 mg.
Thiamine Mononitrate	2.5 mg.
Riboflavin	2.5 mg.
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Pyridoxine HCl	0.5 mg.
Calcium Pantothenate	5 mg.
Vitamin B_{12}	1 mcgm.
Folic Acid	0.375 mg.
Vitamin K Menadione	0.5 mg.

Also available: ACHROMYCIN SF Oral Suspension

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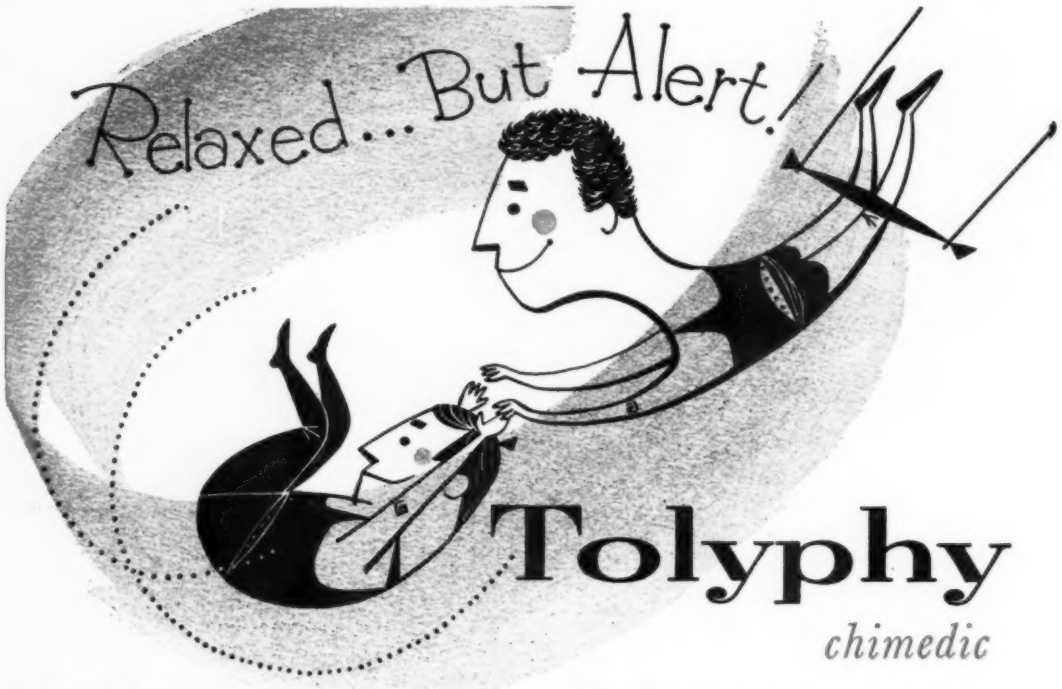

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Tolyphy combines:

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b. Established neuromuscular effects of physostigmine and atropine

to relieve pain, increase mobility, restore muscle strength and function.

Use Tolyphy Chimedic for safe, effective relaxation of muscle spasm or neuromuscular hyperirritability in a wide range of conditions such as

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Tolyspaz (Chimedic brand of Mephenesin) is especially designed to correct emotional stress and anxiety tension states, without "clouding consciousness."[1]

[1] *J.A.M.A. 140:672 (June 25) 1949*

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at ease... you may put your own mind at ease as well as calm your patient when you prescribe Noludar as a sedative (or in larger dosage, as a hypnotic). There is little danger of habituation or other side effects because Noludar is not a barbiturate. Available in 50-mg and 200-mg tablets, and in liquid form, 50 mg per teaspoonful.

REST COMES BEST to the relaxed patient.

Noludar relaxes the patient and usually induces sleep within one-half to one hour, lasting for 6 to 7 hours. Clinical studies in over 3,000 patients have confirmed the usefulness of Noludar in the relief of nervous insomnia and daytime tension. Noludar 'Roche' is not a barbiturate.

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provides easily assimilable extra calories

Easy-to-take EDIOL is a completely stabilized oral fat emulsion. Its unusually small particle size (average, 1 micron) favors ease of digestion and eliminates oily taste. Just 2 tablespoonfuls in a glass of fresh milk, *q.i.d.*, provide 1200 extra calories. Good-tasting EDIOL is supplied in one pint bottles.

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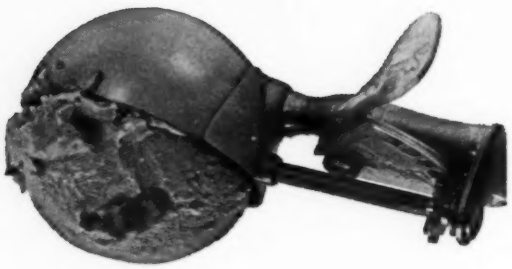
THE UNDERWEIGHT SYNDROME



most likely to appeal

When a patient presents a "feeding problem," ice cream may provide an ideal solution. Containing an excellent form of easily-digested protein, ice cream supplies an abundance of valuable minerals and vitamins, sugar, and moderate fat content for a readily-assimilated source of quick energy.

Because of its high calcium and phosphorus content, ice cream meets specific dietary requirements for the tubercular patient[1] and the pregnant[2] and lactating woman.[3]

An ideal food with which to tempt the older person, ice cream supplies many elements necessary in building resistance to infection[4] —in retaining nutritional status in osteoporosis,[5] in chronic colitis and other gastrointestinal diseases that interfere with digestive processes.[6]

For the pediatric patient, too, ice cream is not only traditional in the post-tonsillectomy period, but is also useful during recovery from poliomyelitis.[7]

Borden's Ice Cream offers the same food values as whole milk, but in different proportions—the same important proteins, minerals, and vitamins. Like other Borden dairy products, Borden's Ice Cream is made from only the finest of fresh milk, homogenized to break down curd size and render it easily digestible. Its high solids content, moreover, assures improved flavor and texture.

And a wide selection of popular flavors is further reason why Borden's Ice Cream is likely to be enjoyed even when the rest of the meal goes untouched. A good reason to include Borden's Ice Cream in the diet—for it has helped solve many a "feeding problem" both in the hospital and out.

Manufacturers and distributors of BORDEN'S Instant Coffee • STARLAC non-fat dry milk • BORDEN'S Evaporated Milk • Fresh Milk • Ice Cream • Cheese • EAGLE BRAND Sweetened Condensed Milk • BREMIL powdered infant food • MULL-SOY hypoallergenic food • BIOLAC infant food • DRYCO infant food • KLIM powdered whole milk

[1]Brewer, W. D., et al: J. Am. Dietet. A. 30:21 [Jan.] 1954. [2]Murphy, G. H., and Wertz, A. W.: J. Am. Dietet. A. 30:34 [Jan.] 1954. [3]Spies, T. D.: J. A. M. A. 153:185 [Sept. 19] 1953. [4]Zeman, F. D., in Stieglitz, E. J.: Geriatric Medicine, ed. 2, Philadelphia, W. B. Saunders Company, 1949, p. 136. [5]Sebrell, W. H., Jr., and Hundley, J. M., in Stieglitz, E. J.: Geriatric Medicine, ed. 3, Philadelphia, J. B. Lippincott Company, 1954, pp. 186-187. [6]Barborka, C. J.: Treatment by Diet, ed. 5, Philadelphia, J. B. Lippincott Company, 1948, pp. 607-608. [7]Seifert, M. H.: J. Am. Dietet. A. 30:671 [July] 1954.

The *Borden* Company

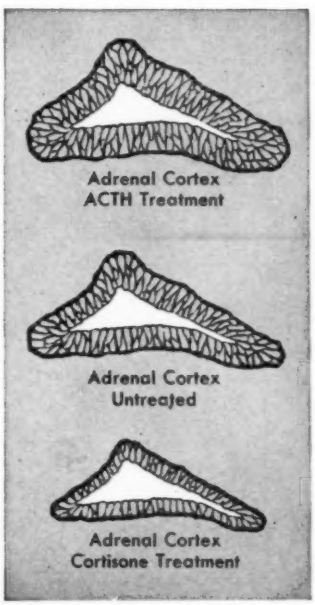
350 Madison Avenue, New York 17, N. Y.

Q

Should atrophy of the adrenal cortex as a result of corticosteroid therapy be prevented?

A

***Yes*—it should be prevented! Atrophy of the adrenal cortex with loss of secretion of adrenal cortical hormones deprives the patient under cortisone therapy of a defense mechanism which can assume vital importance when exposed to unexpected stress.**



THERE IS A DIFFERENCE BETWEEN ACTH AND CORTISONE

For this reason, the response of the adrenal cortex must be preserved. *It can be preserved* by utilizing the antagonism between ACTH and cortisone or hydrocortisone at the adrenal cortical level.

ACTH is capable of counteracting the negative influence of cortisone on the adrenal cortex by its opposite, positive effect on function and structure of the adrenal gland. ACTH *stimulates* . . . cortisone *depresses* adrenal cortical function.

The goal thus is:
To obtain all therapeutic benefits without sacrifice of the adrenal cortex by counterbalancing cortisone with ACTH.

HP*ACTHAR *Gel* (IN GELATIN)

*Highly Purified

HP*ACTHAR® Gel is The Armour Laboratories Brand of Purified Adrenocorticotropic Hormone—Corticotropin (ACTH)

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As a physician, you know how important to young parents is the cost of raising a baby. Also you want to give babies in your care the best possible nourishment. Pet Evaporated Milk helps both ways—it provides all the body-building nourishment of milk, is always uniform in composition and quality. Yet Pet Milk costs less than any other form of milk... *far less than special infant feeding preparations.* It's one milk that keeps babies growing up... infant feeding costs down. In fact, it can save up to $50 on baby's food bill during that vital first year.

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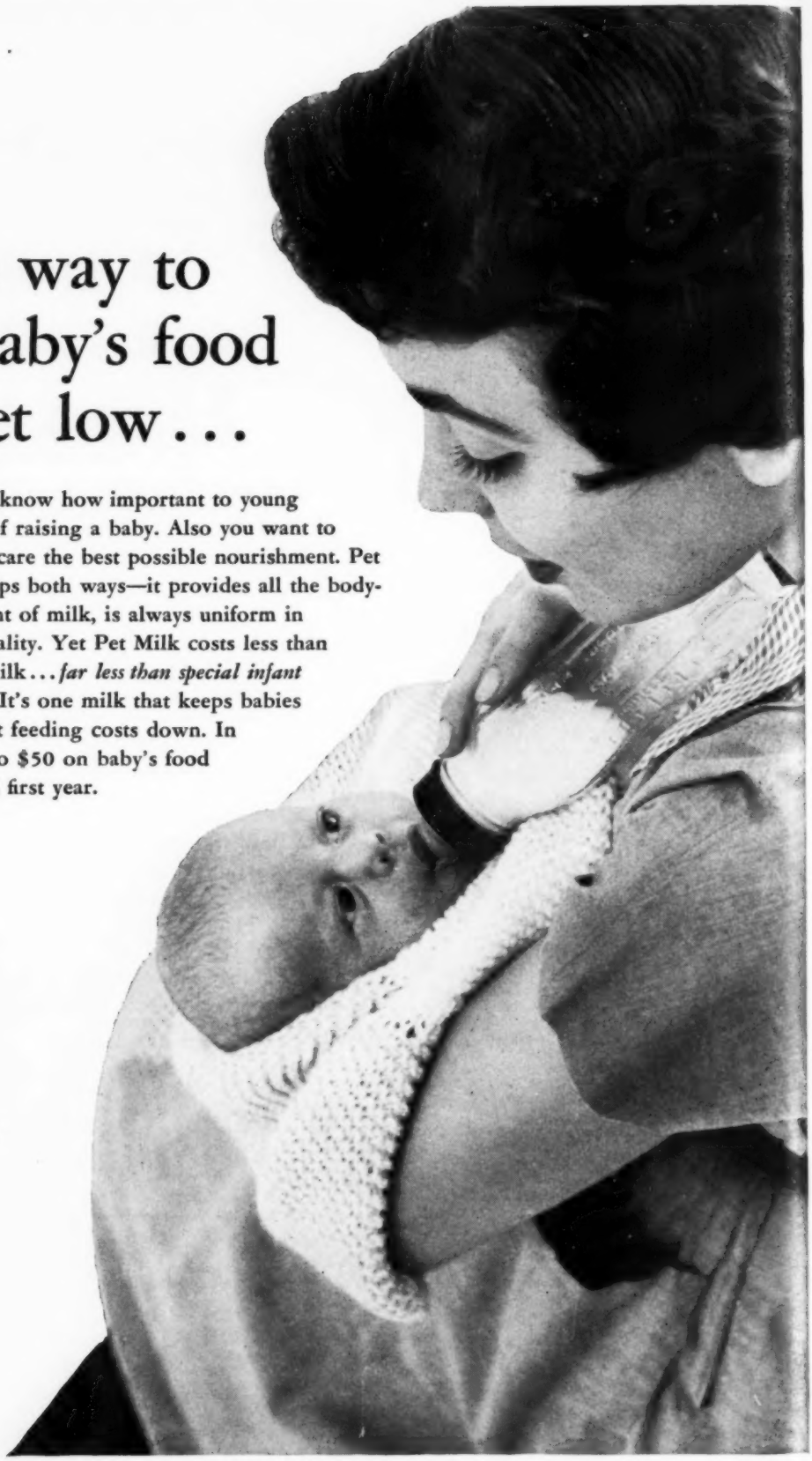

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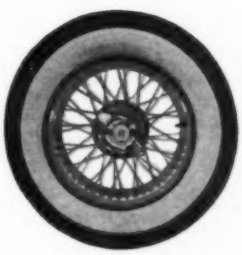

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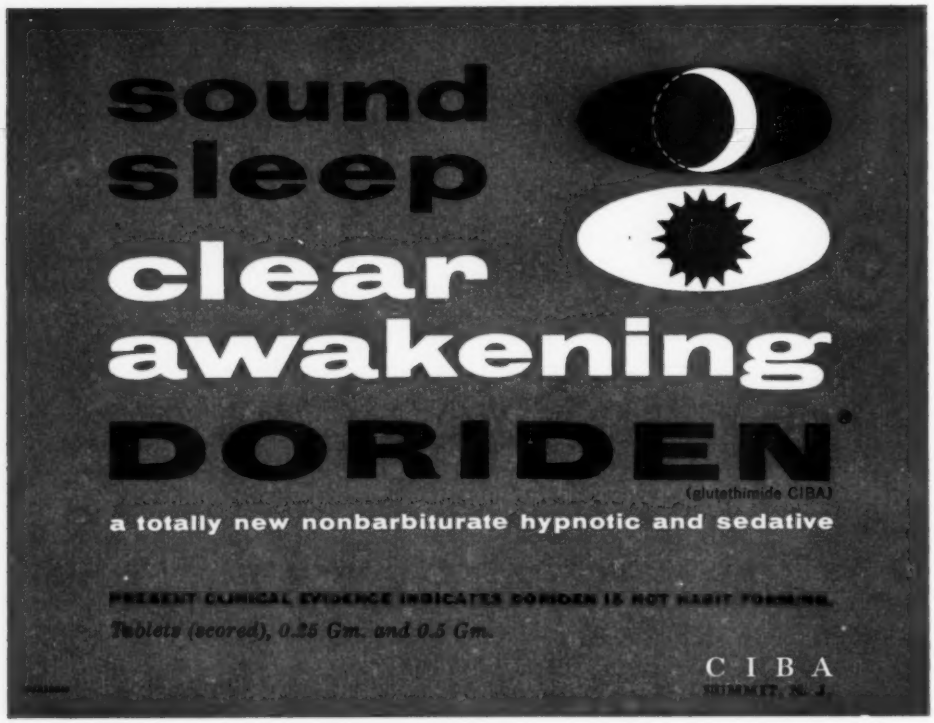
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PRESENT CLINICAL EVIDENCE INDICATES DORIDEN IS NOT HABIT FORMING.
Tablets (scored), 0.25 Gm. and 0.5 Gm.
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Prescribed extensively for intestinal cramps, dysmenorrhea or any smooth muscle spasm, Hayden's Viburnum Compound has, for many years, made it "smooth sailing" on rough days.
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One tablet contains:

A	5000 USP Units
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C	60 mg.
B_1	2 mg.
B_2	2 mg.
B_6	1 mg.
B_{12}	5 mcg.
Calcium Pantothenate	3 mg.
Niacinamide	10 mg.

DOSE: 1 TABLET DAILY

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BOTTLES OF 50 and 100 TABLETS

Pyribenzamine

exerts maximum antiallergic action during the period of allergic stress...

...with freedom from prolonged drug effect in asymptomatic periods

Average Dose:
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why risk side-reactions with a single antihistamine?

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an effective, safer combination of three antihistamines.

Available in Capsules, and exceptionally palatable fruit-flavored Syrup (half-strength) for children.
Each capsule contains:

Pyrilamine maleate	10 mg.
Prophenpyridamine maleate	10 mg.
Phenyltoloxamine dihydrogen citrate	10 mg.

Syrup: Each 5 cc. contains half of the above.

A DORSEY preparation.

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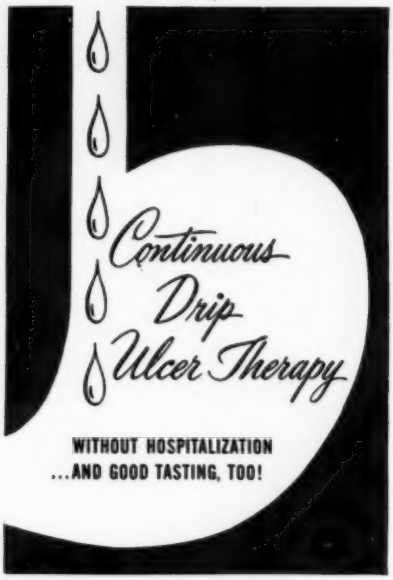

Nulacin

A recent clinical study* of 46 ambulatory nonhospital patients treated with Nulacin† and followed up to 15 months describes the value of ambulatory continuous drip therapy by this method. Total relief of symptoms was afforded to 44 of 46 patients with duodenal ulcer, gastric ulcer and hypertrophic gastritis.

The delicately flavored tablets dissolve slowly in the mouth (not to be chewed or swallowed). They are not noticeable and do not interfere with speech.

Nulacin tablets are supplied in tubes of 25 at all pharmacies. Physicians are invited to send for reprints and clinical sample.

HORLICKS CORPORATION
Pharmaceutical Division
RACINE, WISCONSIN

*Steigmann, F., and Goldberg, E.: Ambulatory Continuous Drip Method in the Treatment of Peptic Ulcer, Am. J. Digest. Dis. 22:67 (Mar.) 1955.

†Mg trisilicate 3.5 gr.; Ca carbonate 2.0 gr.; Mg oxide 2.0 gr.; Mg carbonate 0.5 gr.

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Since 1860 A. S. Aloe Company has helped three generations of physicians open their offices. Whether you plan to begin practice or re-equip an existing office, we can serve you. (1) A National Institution: We have 13 shipping points throughout the nation and more than 200 representatives. (2) Equipment Check Lists. Cover the cost of everything required to outfit your office, from hypodermic needles to X-ray machines. (3) Planning Service. Suggested room layouts scaled to size. (4) Tailored Payment Plan. There are no interest charges under our regular "new office" extended payment plan. (5) Location Service. Aloe representatives know of many attractive locations for beginning practice.

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in rheumatoid arthritis

"...free of significant metabolic, water or electrolyte disturbances."[1]

The higher therapeutic ratio of METICORTEN permits marked clinical benefits unaccompanied by many of the major undesirable actions characteristic of cortisone and hydrocortisone.[1-4]

METICORTEN

PREDNISONE (metacortandracin)

Schering

- avoids sodium and water retention
- avoids weight gain due to edema
- no excessive potassium depletion
- better relief of pain, swelling, tenderness; diminishes joint stiffness
- lowers sedimentation rate even where cortisone or hydrocortisone ceases to be effective—"cortisone escape"
- most effective in smallest dosage

Bibliography

(1) Dordick, J. R., and Gluck, E. J.: Preliminary clinical trials with metacortandracin in rheumatic diseases. Comparative antirheumatic potency, metabolic activity and hormonal properties, J.A.M.A., in press. (2) Bunim, J. J.; Pechet, M. M., and Bollet, A. J.: J.A.M.A. *157*:311, 1955. (3) Barach, A. L.; Bickerman, H. A., and Beck, G. J.: Clinical and physiological studies on the use of metacortandracin in respiratory disease. I. Bronchial asthma, Dis. Chest, in press. (4) Schwartz, E.: Personal communication.

METICORTEN,* brand of prednisone (metacortandracin).
*T.M.

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DESTROYED

"... INDIVIDUAL TRICHOMONADS ARE DESTROYED WITHIN 10 TO 14 SECONDS AFTER CONTACT WITH A 1:250 DILUTION [VAGISEC LIQUID]."

Davis, C. H.: J.A.M.A. 157:126 (Jan. 8) 1955.

are killed in well under 30 seconds. The cumulative or synergistic action of detergent, chelating agent, and wetting agent has produced a compound lethal for various animal micro-organisms in a dilution that is relatively nontoxic and nonirritating.[1]

Motion pictures taken through a phase-contrast microscope at 24 frames per second show that individual trichomonads are destroyed within 10 to 14 seconds after contact with a 1:250 solution of Carlendacide (fig. 2 and 3). Owing to the presence of blood serum or agar in the culture mediums, contact with some flagellates on a slide is delayed, but in our tests all have been killed

In his new *J.A.M.A.* article, Dr. Carl Henry Davis reviews his experience with the new trichomonacide which he and C. G. Grand, research physiologist, developed under the name of "Carlendacide." Now available as VAGISEC jelly and liquid, it has been shown on clinical trial to clear up even stubborn cases of vaginal trichomoniasis. "Adequate office and home treatment can effect a cure of T. vaginalis infections, if limited to the vagina, within four weeks."[1]

Synergistic action. VAGISEC liquid attacks the trichomonad with three surface-acting chemicals.[2] The *chelating agent* tears out the calcium of the calcium proteinate from the cell membrane of the trichomonad. The *wetting agent* lowers surface tension and removes waxes and lipid materials from the cell membrane. The *detergent* denatures the protein. With the cell membrane destroyed, the cytoplasm imbibes water from its surroundings, swells up and explodes.[3] *Synergism accomplishes this within 15 seconds!*

Thorough peneration. VAGISEC jelly and liquid penetrate the cellular debris and mucoid material that line the vaginal wall and reach hidden trichomonads that lie buried among the rugae. They dissolve mucinous material and explode hidden trichomonads as well as trichomonads on the surface of the vaginal wall.[4]

Trichomonads destroyed in 15 seconds. No other agent or combination of agents kills the trichomonad in this specific fashion, or with the speed of VAGISEC liquid.[2] Dr. Davis studied this action under the phase-contrast microscope and actually *saw* individual trichomonads destroyed within 15 seconds of contact with a 1:250 solution.[1]

Clinical tests. VAGISEC liquid has been clinically tested by over 100 leaders in obstetrics and gynecology. Those who have followed the plan of treatment have had better than 80 per cent of cures among non-pregnant patients with one course of treatment.[1]

The Davis technic.† The Davis technic is a combination of office treatment with VAGISEC liquid and prescribed home treatment with both VAGISEC jelly and liquid.[1] Dr. Davis says that office treatment is an essential part of the technic.

Write for: reprint of Dr. Davis' article,[1] file card giving complete details of Davis technic, and pad of patient instruction sheets for home treatment. Address Julius Schmid, Inc., 423 West 55th Street, New York 19, N. Y.

Bibliography

1. Davis, C. H.: J.A.M.A. 157:126 (Jan. 8) 1955. 2. Davis, C. H.: Am. J. Obst. & Gynec. 68:559 (Aug.) 1954. 3. Davis, C. H.: .West. J. Surg. 63:53 (Feb.) 1955. 4. Davis, C. H.: J.A.M.A. 92:306 (Jan. 26) 1929.

JULIUS SCHMID, INC. *gynecological division*
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VAGISEC is a trade-mark of Julius Schmid, Inc. †Pat. app. for

Active ingredients: Polyoxyethylene nonyl phenol, Sodium ethylene diamine tetra-acetate, Sodium dioctyl sulfosuccinate. In addition, VAGISEC jelly contains Boric acid, Alcohol 5% by weight.

Better Patient Cooperation

Because of

Simpler, More Effective Combination Therapy

in hypertension

The combination of Rauwiloid with more potent hypotensive agents, such as Veriloid and hexamethonium, each in single tablet form, simplifies and makes more effective the treatment of advanced, severe forms of hypertension.

SIMPLER... because the physician need prescribe only one medication and the patient need not cope with complicated dosage schedules. The flat dose-response curve of the contained Rauwiloid permits dosage to be governed solely by the response to the more potent hypotensive agent in the combination.

MORE EFFECTIVE... because of the synergistic influence of Rauwiloid on the potent hypotensive agents, thus permitting greater efficacy from smaller dosage. Side actions of these potent hypotensive drugs are notably reduced. These combinations are virtually free from allergic toxicity.

RAUWILOID® + VERILOID®

A Riker Single-tablet Preparation

Indicated in moderately severe hypertension. Each tablet contains 1 mg. Rauwiloid and 3 mg. Veriloid.

Initial dosage, one tablet t.i.d., p.c. Available in bottles of 100 tablets.

RAUWILOID® + HEXAMETHONIUM

A Riker Single-tablet Preparation

Indicated in rapidly progressing, otherwise intractable hypertension. Each tablet contains 1 mg. Rauwiloid and 250 mg. hexamethonium chloride dihydrate.

Initial dosage, one-half tablet q.i.d. Available in bottles of 100 tablets.

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a more complete product for the treatment of urinary tract infections

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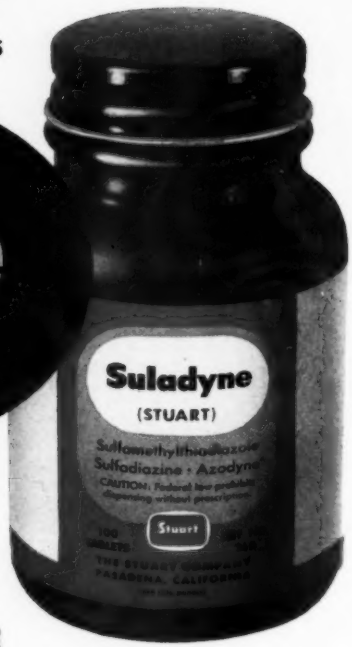

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1. SULFAMETHYLTHIADIAZOLE to provide rapid and high sulfa concentration in the urine.

2. SULFADIAZINE to provide adequate blood levels.

3. AZODYNE* to provide fast symptomatic relief, making the patient more comfortable.

Stuart brand of Phenylazo-Diaminopyridine HCl

ONE TABLET CONTAINS:

SULFAMETHYLTHIADIAZOLE	125 mg.
SULFADIAZINE	125 mg.
AZODYNE	75 mg.

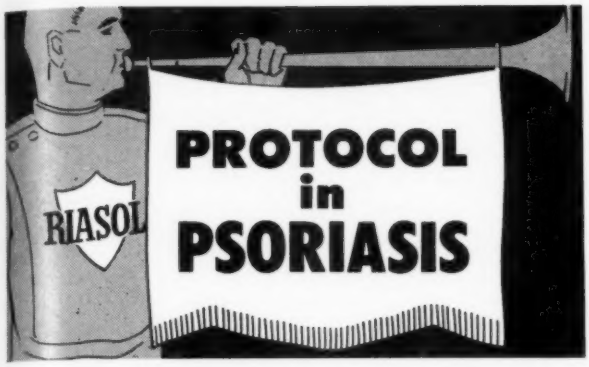
Effective low sulfa dosage

USUAL DOSE: Initially 4 tablets, then 2 tablets 4 times daily.

SUPPLIED: BOTTLES OF 100 TABLETS AT ALL PHARMACIES

Stuart

Pasadena, California



In a recent article in the *British Medical Journal*, *Ingram emphasized three important points: (1) The disease is milder in summer. (2) Psoriasis is essentially an epidermal reaction and hence should receive local therapy. (3) Treatment must be continued until the skin is clear; not a single active lesion can be left if extension is to be avoided.

These lessons apply to RIASOL, the effective local treatment for psoriasis:

(1) Attack psoriasis in the summer, when treatment proves most effective.

(2) Prescribe RIASOL, which improved the skin patches in 76% of a series of cases in which other treatments had failed.

(3) Continue the use of RIASOL until every patch of psoriasis has disappeared, and in fact for several weeks afterwards.

RIASOL contains 0.45% mercury chemically combined with soaps, 0.5% phenol and 0.75% cresol in a washable, non-staining, odorless vehicle.

Apply daily after a mild soap bath and thorough drying. A thin, invisible, economical film suffices. No bandages required. After one week, adjust to patient's progress.

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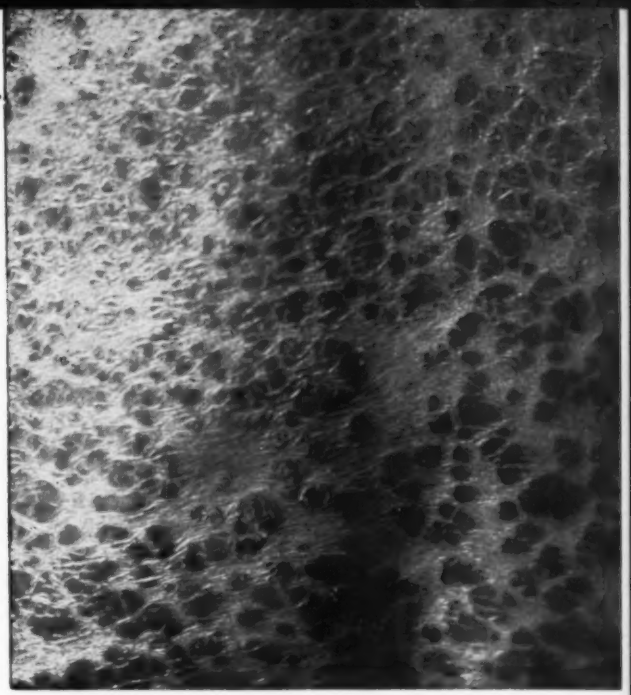
*Ingram, J.T., Approach to Psoriasis, *British Medical Journal*, 2:591, 1953.



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Methods in Taking and Interpreting Weight-Bearing X-Ray Films*

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INTRODUCTION

The purpose of this paper is to report the development of methods and procedures for taking and interpreting radiographs which are used to determine the anatomic relationships and movement characteristics of the joints of the axial skeleton.

The basic reason for taking weight-bearing x-ray films in both clinical practice and research is to determine the presence and extent of stresses which might have a deleterious effect on the patient, both locally and in remote tissues and organs. There are many structures that are bilaterally similar and many structures that are similar in each individual of the species. This, together with the fact that there appears to be a high incidence of functional deviation in the situations where vertebral and pelvic joints are asymmetrical in that they differ from the common pattern or are bilaterally dissimilar, has led to general recognition that such asymmetry apparently encroaches to some degree on maximum functional efficiency.

Some degree of asymmetry is present in every human (and possibly in every quadruped as well). Hence an extremely important question is: How much, and under what conditions, is asymmetry associated with both functional and structural abnormality in the musculoskeletal system itself and in related tissues and organs?

However, before this question can be answered it has been necessary to develop methods and procedures, which can be calibrated and standardized, to identify the structural configuration and the functional characteristics of the axial skeleton.

The factors which are important in these methods are (a) the placement of the equipment and the patient, that is, the relationship of the tube and the patient and the x-ray film, (b) the factors of magnification and distortion, and (c) the reliability or stability of radiologic findings in the weight-bearing position.

EQUIPMENT AND METHODS

These studies have been made with conventional equipment consisting of a 100 MA Coolidge tube, a vertical Bucky diaphragm, and a motor-driven tilt table and arranged as shown in Figure 1. A large steel plate was placed in front of the upright Bucky to insure a perfectly level base for the patient. The face of the tube was placed parallel with the film, with the tube located so that the central ray would fall at the center of the film. This was accomplished by aligning the tube and the x-ray film in such a manner that two sets of vertical and horizontal wires, which are similarly oriented to the tube and film, were superimposed on the film.§ The pair of wires which were closest to the film was left mounted on the apparatus permanently. The vertical wire is an upward projection of the mid-heel point and is called the mid-heel line.

The tube stand and vertical cassette carrier are calibrated to permit determination of the precise location of the tube and of the film each time a film is taken. The carrier in the tilt table in the horizontal position is also calibrated with the tube rail to permit approximate duplication of the tube-object-film relationships between vertical and horizontal placements.

Each time a film is made the technic and patient position are recorded. This includes voltage, amperage, time, height of tube and film, and the relation of the patient's feet to the mid-heel line and to the face of the x-ray film. This permits reduplication of the x-ray procedure when serial or repeat films are taken. Obviously, when two films on a given subject are taken in this manner with precisely the same technic being used, any change in the x-ray image must be due to change within the subject. Such change, as will be discussed later, must be due to change in the subject's position in

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§While it was necessary, for research purposes, to locate the central ray precisely in both the vertical and horizontal planes at a right angle to the center of the film, such precision is not necessary for clinical work. The differences in radiographic images from slight deviations of the central ray from the center of the film are so small as to be of negligible importance.

Fig. 1

Fig. 2

space or to a change in the anatomic relationships of the various parts of the subject (as might occur in increases or decreases in lateral flexion, rotation, et cetera).

EXPERIMENTAL PROCEDURES AND OBSERVATIONS

Positioning of the Patient.—

Roentgenograms are taken in the weight-bearing position, primarily, to determine the height of the femur heads, the level of the sacral base plane, and the position of the pelvis and the vertebral segments in terms of rotation, lateral flexion, and side sway in the erect patient. To accomplish such determinations it is necessary to have a point of reference from which measurements can be made.

Hoskins,[1-4] who did the pioneer work in this field, selected the mid-heel line (a vertical projection of a point equidistant between the patient's heels) as the most useful point of reference. He arranged the apparatus so that this line bisected the film and placed the patient's feet, with both knees fully extended, equidistant from this line. He placed the feet close together and permitted the patient little or no support. His reasoning was that even in this position the mechanically stable patient could stand comfortably and without movement while the mechanically unstable patient would sway and move to an extent sufficient to produce a blurring of the x-ray image. For the most part, subsequent studies in this field, including the work reported herein, have continued to use this method.

However, while there has been widespread agreement concerning the usefulness of the mid-heel line, there have been differences of opinion as to the spacing of the feet on each side of the line. After considerable experimentation, and for reasons which will be discussed in detail in a later section (section on side sway) we decided that the medial aspect of each foot should be placed 3 inches lateral to the mid-heel line. This 6-inch interfoot space, which permits the lower extremities to be nearly parallel, has been used throughout this work.

The front-to-back positioning of the feet also proved to be of considerable importance. In the early studies, in order to secure films which represented the most nearly natural weight-bearing picture, the patients were instructed to stand in front of the upright Bucky, to place the inner sides of the feet along two parallel lines which were 6 inches apart (each being 3 inches from the mid-heel line) and to lean back lightly against the front of the Bucky. It was soon discovered that in so doing the patients did not always place the two heels on a line parallel to the film, nor did they place the heels in the same relationship to the film each time they were examined. In addition, when the feet were moved backward until the trunk was in light contact with the Bucky one or both of the patient's feet might be in front, in the same plane, or behind the face of the Bucky. Hence several lines, each parallel to the face of the Bucky, were established and are shown in Figure 2. Both of the patient's heels are placed on that line which brings a part of his trunk in light contact with the Bucky.

Stability of Findings.—

One of the important points to be established in studies of anatomic relationships and joint movement characteristics is whether or not these relationships and characteristics remain approximately the same, from time to time, if the patient's general physical condition remains the same. In other words, is it possible to standardize the x-ray procedure, as other clinical tests have been standardized, so that a single examination may be considered to provide accurate and valid findings? More than twenty-five preliminary studies, in which patients were x-rayed two or more times, at various intervals, and using identical x-ray technic, indicated that the anatomic relationships of the axial

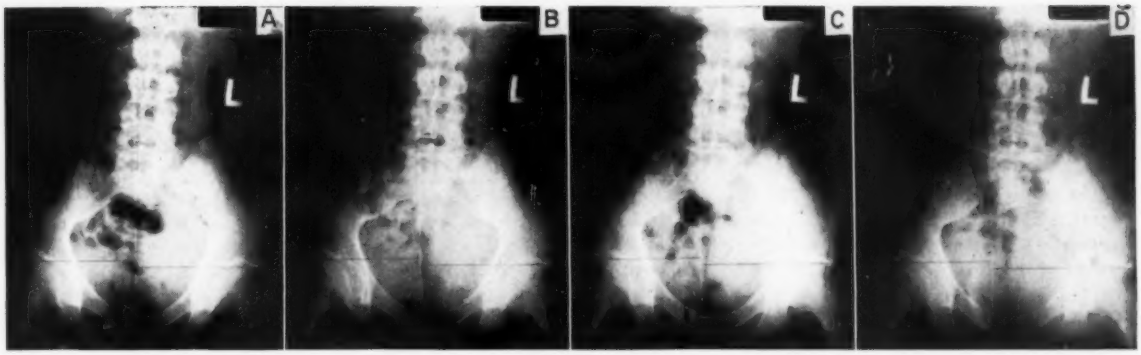


Fig. 3

skeleton are reasonably stable. The femur head heights, symphysis pubis, obturator foramina, pelvic outlet, sacral-base plane, and iliac crests remained in almost identical relationships, one to another, for long periods (up to 2 years). In cases where there were slight film-to-film differences in these structures it was obvious that these discrepancies were due to slight differences in the relation of the entire trunk to the x-ray tube and film; the differences were not due to changes in the relationships of one part to another.

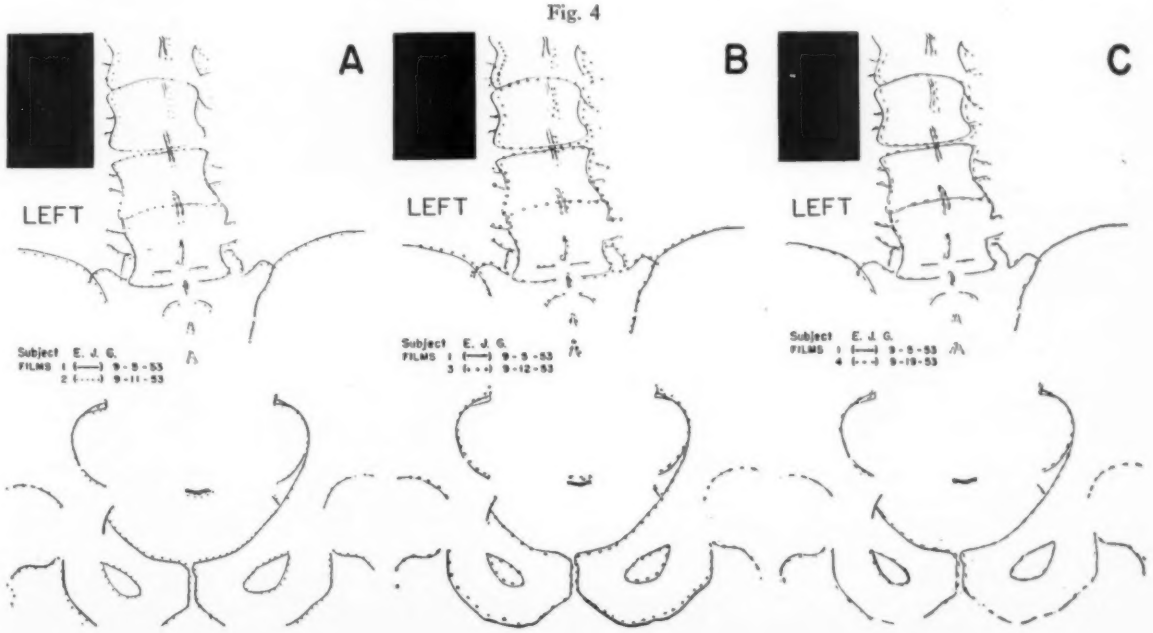
The same findings, with one major and one minor exception, were also observed in the segments of the lumbar spine. The major exception involved differences in flexion or extension since patients frequently showed some relatively slight film-to-film differences in the forward-backward tilt of the pelvis and in the degree of anatomic curve in the lumbar area. The minor exception involved patients who had some degree of lateral curvature. In these patients the degree of lateral flexion or rotation or both might be slightly different from film to film.

This problem was studied further by taking four films on a series of six subjects. The intervals between the first and last films in this series were not less than 2 weeks or more than 7 months. The appropriate x-ray technic was selected for each subject and repeated each time that subject was examined. The four x-ray films on one patient are shown in Figure 3.

In these studies it soon became obvious that while in general the x-ray findings in each patient remained approximately the same at each examination, it was necessary to secure a better method of comparing films than was possible by visual comparisons of the films themselves. Hence a method was developed for tracing clearly defined anatomic landmarks on transparencies. The tracing of one film was used as a reference and each of the others, in turn, was superimposed on it and each pair was photographed. As is shown in Figure 3 the patient's trunk was not in precisely the same relationship to the tube and film each time a film was made. Consequently the films themselves (or the tracings made from them) could not be superimposed directly. After considerable experimentation, it was found most useful to arrange each pair of tracings so that the femur heads were exactly superimposed. This provided a point of common reference and permitted a valid comparison of the similarity, or dissimilarity, of the anatomic relationships of other parts of the lumbar spine and pelvis.

The findings of these studies, in which four films

Fig. 4



were made on each patient, confirmed earlier observations, that is, the anatomic relationships of the pelvic girdle and lumbar segments remain relatively constant except for relatively slight differences in the tilt of the pelvis and in the degree of anatomic curve in the lumbar area and in the degree of rotation or lateral flexion in cases of spinal curvature. A typical example of these studies is shown in Figure 4 in which tracings of the x-rays of Figure 3 are shown. This patient obviously shows a high degree of stability in the relationships of the pelvis with slight differences in the degree of lateral lumbar curvature and considerable difference in the degree of lumbar anatomic curve. These differences are clearly shown at L2 in Figure 4B.

Magnification and Distortion.—The factors of magnification and distortion which are inherent in virtually all x-ray procedures are commonly considered together since they are both involved in the arrangement and type of x-ray equipment used and in the positioning of the patient in relation to the equipment. However, in this discussion it appears best to treat these factors separately.

Magnification.—

The factor of magnification is inherent to some degree in nearly all x-ray procedures. It is important here primarily because of its bearing on measurements involving the presence and degree of discrepancies in the heights of bilateral structures such as the femur heads, the crests of the ilia, and the ala of the sacrum. This factor may be approached in two ways: first, by use of special technics which either eliminate or greatly minimize magnification and, second, by the calculation of the magnification errors when conventional equipment is employed.

The special technics which may be used to decrease magnification and distortion involve procedures which make maximum use of the central ray and the x-ray beam immediately surrounding it and which keep the beam at an appropriate angle with the film.

The central ray, for all practical purposes, represents the one point on each film that interrupts an x-ray at 90 degrees to its source; at this point no magnification exists. About this central ray the elements of magnification radiate equally. Obviously then, except at the precise location of the central ray, the greater the distance between two points which are in a plane parallel to the film, the greater will be the magnification of the apparent distance between those points.

The optimum use of the central ray to decrease magnification involves a method called cryptoradiography. Here a battery of x-ray tubes is arranged so that for the most part the only rays reaching the film from each tube are central rays. This procedure almost completely eliminates magnification; however, it subjects the patient to great amounts of radiation, and the equipment is both costly and cumbersome.

Millwee[5] with slit scanography, Mueller and Higgason[6] with spot scanography, and others have devised methods of making multiple exposures with a very narrow or a small x-ray beam, and with a well-controlled tube-object-film relationship, to secure a more accurate image of the bones, joints, or other parts being examined by x-ray. However, these procedures also require expensive equipment, they involve difficult technical problems, and they have limited applications.

Because of these difficulties it was decided that these studies would be done with conventional equipment and that magnification errors would be determined by calculation; a series of experimental procedures for the development of calculation methods was carried out.

The x-ray image of any object, as is well known, is determined (a) by the actual external and internal configuration of the object and (b) by the relation of the object to the tube and film. The degree to which the x-ray image is magnified can be determined mathematically by the Files formula[7] as follows:

$$\frac{D}{D-d} - 1 \times 100 = \%$$

D=focal (film) distance
d=object (film) distance

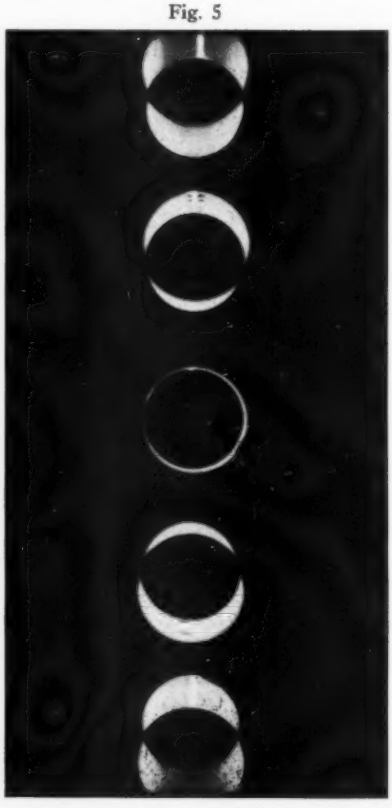
This formula gives the percentage of diameter magnification.

In using this formula it is obviously a simple matter to determine the tube-to-film distance. However, since the part of the object which is of interest on the radiograph is usually deeply placed it is necessary to estimate the object-to-film distance. Magnification may be estimated by the following table.

Tube-to-Film Distance	Object-to-Film Distance (Estimated)	Per Cent of Magnification (Estimated)
40 in.	5 in.	14.3
40 in.	6 in.	17.6
40 in.	7 in.	21.2
40 in.	8 in.	25.0

Obviously, if bilateral structures are equidistant from the film, the magnification of these structures (and of any discrepancies between them) will be the same on both sides. However, when one part of the

Fig. 5



object, as in pelvic rotation, is farther from the film than the other, the magnification on the two sides must be estimated separately. Fortunately, when bilateral structures are not equidistant from the film, this condition is characterized by certain distortions of the image of all related structures. The recognition of such distortion permits proper allowance for the different magnification that is present on the two sides.

Distortion.—

The x-ray image is, of course, determined by the density of each part of the object which is interposed between the tube and the film. Hence, with a knowledge of the tube-object-film relationship it is possible to predetermine the so-called normal image that will be produced each time an x-ray film is made. At the risk of belaboring too simple a point, an illustration of the projection phenomena in x-ray is shown in Figure 5. Here a series of identical metal cylinders has been placed in different relationships to the tube and film to portray the different images which will be produced. Since x-rays travel in straight but divergent lines from the tube to the film (upward and outward above the center point on the film and downward and outward below it) the cylinder at the center of the film is the only one which shows a true image; the others are distorted.

For x-ray films of the axial skeleton the patient's trunk is placed so that the true image should show a somewhat magnified but bilaterally symmetrical image for each bilaterally similar part of the lumbar spine and pelvis. Distortion is present when deviations from this image occur.

In this work the factors, singly or in combination, which may account for distortion are:

1. Actual asymmetry in the structures themselves
2. Distortion of the radiographic image by an asymmetrical placement of the entire trunk in space, that is, in relation to the tube and film
3. Distortion of the radiographic image of the structure by altered relationships between osseous components of the vertebral column and pelvis.

Bilateral Asymmetry of the Size and Shape of Osseous Structure: Asymmetry of the size and shape of a bilateral structure is, of course, shown by asymmetry in the x-ray image of the structure. Such asymmetry is most frequently recognized by the simple observation that it is localized to the structure which is involved while adjacent parts are shown to be symmetrical. A good example of this is seen where there is a unilateral bat-wing anomaly involving one transverse process of the fifth lumbar vertebra. Here the fifth lumbar may be quite asymmetrical while the other lumbar vertebrae and the pelvis have symmetrical outlines on both sides.

Placement in Space:

The feature that distinguishes distortion which is due to asymmetry of the patient's trunk in relation to the location of the x-ray tube and film is that all parts of the trunk are distorted in a somewhat uniform pattern.

In weight-bearing studies the most troublesome distortion results from rotation or from side sway where these factors involve the entire axial skeleton or from a combination of both. In other words, while the feet may be equidistant from and parallel to the mid-heel line, we commonly see patients in whom the trunk is turned or swayed to one side. The resulting distortion produces apparent asymmetries in the image of bilateral structures. Equally important, the distortion also produces increases or decreases in apparent discrepancies between the height of bilateral structures such as the femur heads.

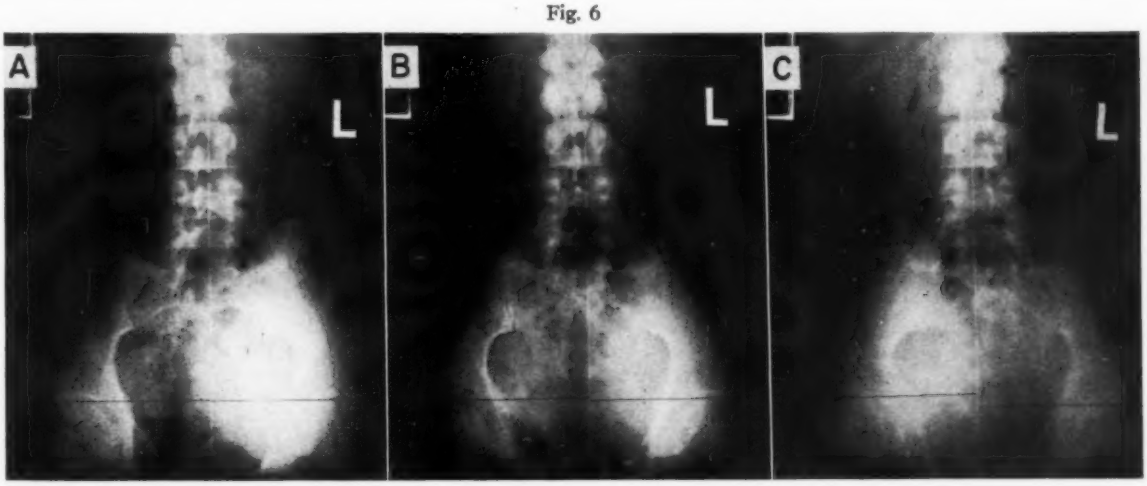
The distortion which is due to rotation is shown in Figure 6. In Figure 6B the patient is standing on a platform directly in front of the upright Bucky; his feet are 6 inches apart and equidistant from the mid-heel line and his heels are on a line parallel to the face of the film. In this position, except for a slight side sway of the entire trunk to the right and a minor shortness of the left leg, the pelvis and lumbar spine are reasonably symmetrical.‖

In Figure 6A the platform on which the patient is standing has been rotated 10 degrees to the left and a second film taken.¶ This film shows the distortion

‖An unusual feature of this film is that even the anomalous lumbosacral junction is relatively symmetrical.

¶In actual patients it has been found that even with the feet asymmetrically placed, the trunk may be rotated or side swayed en masse. Here, obviously, the lower extremities are symmetrically placed at the floor but are asymmetrical at the femur heads. However, the distortion of the trunk itself, from rotation or side sway, is essentially the same whether the lower extremities are asymmetrical just at the top or throughout their entire lengths. Hence, since for experimental purposes the distortion effect of rotation could be studied and controlled best by moving the entire patient, a rotating platform to permit such total movement was constructed and used.

Fig. 6



which results from a rotation of the entire trunk, en masse, in relation to the tube and film. Individual findings include: (a) the femur head discrepancy has decreased as the left femur has moved toward and the right away from the film, that is, as one femur head moves away from the film its image appears lower on the film and vice versa; (b) the pelvic outlet is asymmetrical with the right ischial spine hidden and the left apparently enlarged; (c) the right innominate is narrowed and the left widened; (d) the symphysis pubis is to the left of the median sacral crest; (e) there appears to be rotation of the lumbar spine to the left; and (f) there appears to be a scoliotic type of curve convex to the left. When the trunk is rotated to the right, as in Figure 6C, the findings are, of course, reversed.

The distortion which is due to side sway of the entire trunk involves, primarily, measurements of the height of bilateral structures such as the femur heads. The degree of distortion is determined by the relation of the two lower extremities to each other. This is shown, diagramatically, in Figure 7 where two upright

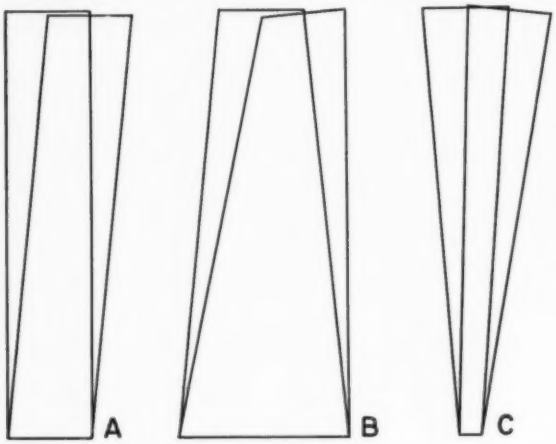


Fig. 7

lines are used to depict the two lower extremities. Here it is seen that when the two lower extremities are parallel the femur head heights retain the same relationship one to the other regardless of whether or not the patient is side swayed. However, these relationships change when the feet are closer together, or farther apart, than the femur heads. With feet closer together than the femur heads and with the patient side swayed to one side, the femur head on the side toward which the side sway occurs is lowered in relation to the one on the opposite side. Conversely, when the feet are farther apart than the femur heads and the patient is side swayed to one side the femur head on that side is raised in relation to its opposite fellow. Hence it becomes apparent that unless the lower extremities are exactly parallel side sway will alter the height relationships of bilateral structures.

The practical aspects of the influence of distortion due to side sway have been studied on actual patients by means of serial x-rays. A series of six films was made on patients with a known leg-length discrepancy. Three films were taken with the patient standing in the usual erect position. The first was taken with the feet together, the second and third with the feet 6 and 12 inches apart respectively. The patient was then side swayed approximately 3 inches and the three films repeated.

The results of one side-sway experiment are shown in Figure 8. In Figures 8A, 8B, and 8C, it is shown that without side sway the femur head discrepancy remains nearly the same when the feet are together or 6 or 12 inches apart. In other words, with the patient's trunk and feet centered at or near the mid-heel line, it is relatively unimportant whether the space between the feet is large or small since the width of the space does not materially affect the femur head heights. Likewise, as shown in Figures 8A and 8D, there is little change in femur head height when the patient is side swayed with the feet 6 inches apart (lower extremities nearly parallel). However the distortion is very marked and the relative heights of the femur heads are changed considerably when the patient is side swayed with the feet either close together or far apart. This may be seen by contrasting Figures 8B and 8E taken with the feet close together and Figures 8C and 8F which were taken with the feet 12 inches apart. With the feet close together and the patient side swayed the femur height discrepancy appears to be much greater than is shown with the patient erect (Figs. 8B and 8E). With the feet separated 12 inches and the patient side swayed the femur head discrepancy appears to be shifted to the opposite side (Figs. 8C and 8F).

SUMMARY AND DISCUSSION

It has become apparent that satisfactory studies of the human vertebral axis can be made with the conventional x-ray apparatus used in all well-equipped x-ray laboratories whether they are located in a hospital or clinic or in a physician's office. This has been indicated by previous work, much of which has been ably summarized by Beal[8] in his paper, "A Review of the Short Leg Problem," and which is further confirmed by these studies.

Most recorded technics for taking weight-bearing x-ray films have not emphasized some of the factors leading to error which are pointed out in this study and the purpose of this study was to investigate as many factors as possible and to establish a useful and widely applicable technic.

The observations will be summarized and discussed in the same sequence in which they appeared in the sections on methods and results.

Equipment.—

Little needs to be added to what has already been stated as regards equipment except to state that more attention needs to be directed to the possibility of using apparatus which will permit longer tube-film distances with the attendant decrease in magnification and distortion errors. The work of Shtasel[9] in this direction seems to offer considerable promise.

The recording of the technic used in taking weight-bearing films, particularly as regards the height of the tube and film and the location of the patient's feet, needs great emphasis. It is only by this means that valid follow-up studies can be made since, for the most part, magnification and distortion factors simply prohibit film-to-film comparisons unless the same, or nearly the same, technic is used for each film.

Patient Positioning.—

In the positioning of the patient there have been two questions that have been quite controversial. One involves the placement of the feet, the other the use of a standardized position of the patient.

Our observations have been that the lower extremities must be nearly parallel, as permitted by a

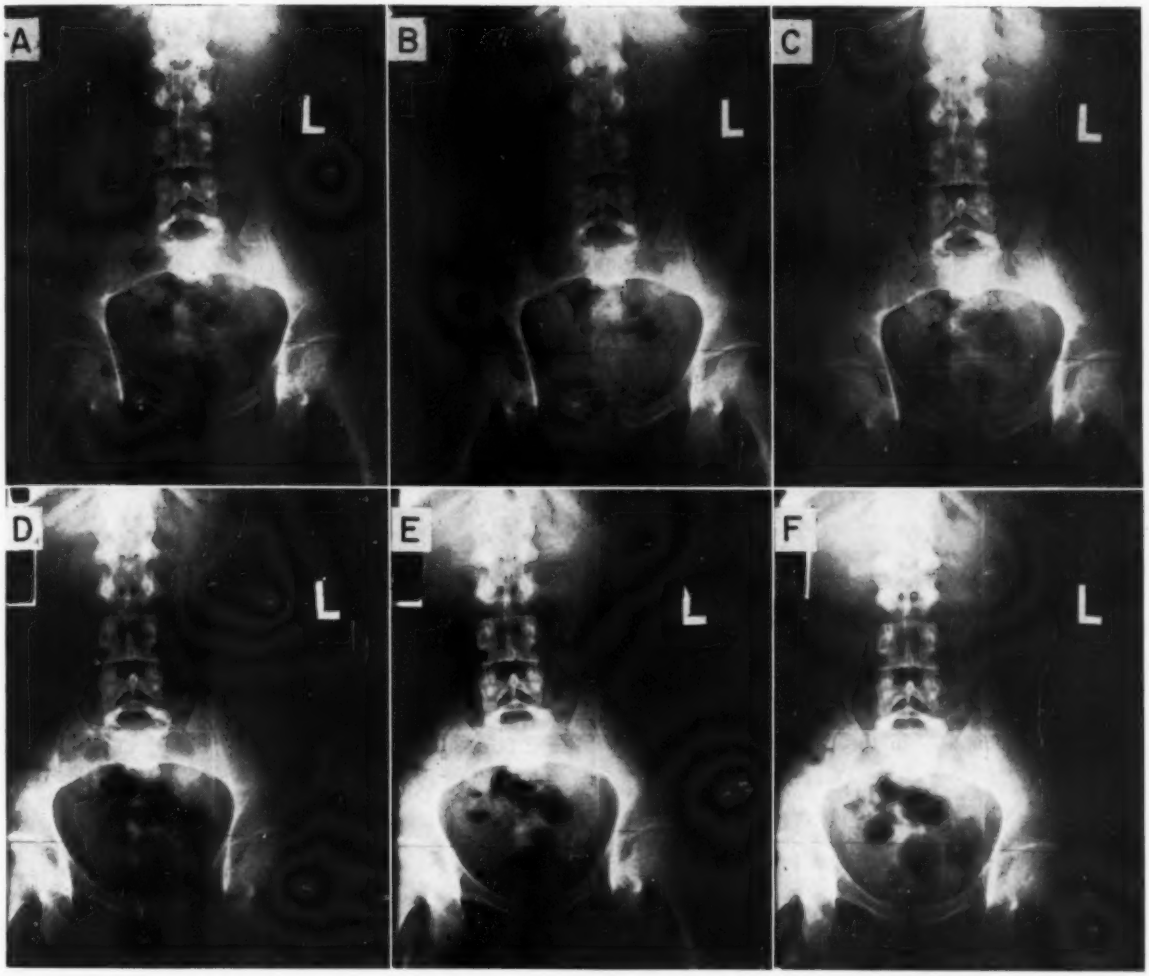


Fig. 8. Films A and D, B and E, and C and F were made with the patient's feet separated 6 inches, together, and separated 12 inches, respectively. In D, E, and F the patient was side swayed approximately 3 inches to the right.

6-inch interfoot space and with the heels on a line parallel to the face of the Bucky.

We also found that a standardized position must be used to determine structural configuration and alignment particularly when follow-up films are to be taken. The standardized position which was finally adopted is very simple. The patient's feet are placed 6 inches apart, the heels are placed on a line parallel to the face of the film which permits one part of the trunk to be in light contact with the Bucky, and the knees are extended.

At this point it must be recognized that weight-bearing films portray the structural configuration and joint relationships of the axial skeleton with the patient in an arbitrarily selected standardized position. These films do not portray the patient's posture or the stance which is most comfortable for him. In fact, quite the reverse is true since patients who have a major asymmetry, for example, in the heights of the two femurs, almost invariably adjust themselves to such a condition by compensatory mechanisms such as the slight flexion of one knee or the adduction of one leg.

Hence, the ideal procedure is to take one film in the standardized position with the feet placed symmetrically at the mid-heel line and with the knees fully extended to determine the femur head heights, the sacral base plane, et cetera; the patient can then be permitted to assume his usual posture and the findings under these conditions determined by visual observation or by other x-ray studies. It may then be possible to study and evaluate structural configuration and joint relationships and the compensatory mechanisms by which the patient attempts to secure maximum ease and comfort.

Stability of Findings.—This study has shown that the standardized technic described will allow repeatable films as long as the subject's physical condition is relatively unchanged. Under these conditions the patient has essentially the same anatomical relationships as determined by the x-ray.

Film Interpretation.—In weight-bearing x-ray films, where measurements of bilateral structures are to be made, it is important to recall that information must be secured by a correct interpretation of the x-ray image. Interpretation is necessary because (a) x-ray films portray a two-dimensional view of a three-dimensional object and (b) the x-ray image is subject to both magnification and distortion.

Magnification.—

Magnification of the x-ray image is of importance in these studies primarily because of its bearing on measurements of the height of bilateral structures such as the femur heads and the iliac crests. Fortunately, on the basis of the Files formula,[2] it is possible to estimate the magnification of the image when the relevant information concerning the position of the patient in relation to the x-ray tube and film is known. The major precaution here involves situations where the patient's trunk is rotated, and bilateral structures, such as the femur heads, are not equidistant from the film.

Because of the divergence of the x-ray beam from the small focal spot of the tube to the large film it is obvious that as an object is moved away from the film and toward the tube (with the central ray located at the approximate center of the film) the image of the object is moved toward the periphery of the film.

Thus, when two objects of equal height are placed equidistant from the film their images will appear at the same height on the film. However, when one of the objects is moved closer to the film its image will be moved toward the center of the film.

Obviously, each film must be examined with allowance for any differences between the two objects or two parts of one object and the film. Unless this is done the incorrect impression may be gained that discrepancies are present even though actually they do not exist.

Distortion.—

A distorted image, in these studies, is caused by the following factors, singly or in combination, (a) abnormality in the structure itself, (b) rotation or side sway of the entire trunk in relation to the equipment, and (c) altered relationships between osseous components of the vertebral column and pelvis. Fortunately, however, reasonable care in interpretation permits a high degree of accuracy in determining the presence and in estimating the extent of abnormality either in structural configuration or alignment. Such interpretation is based on the following points.

1. Abnormality in the structure itself is characterized by a distorted image of the structure involved while contiguous structures have a normal image.

2. Rotation or side sway are characterized by distortion which is fairly uniform throughout all of the structures shown on the film.

3. Malalignment of certain parts is characterized by distortion of those parts while the other parts on the film show a normal image.

Interpretation is most difficult where a combination of the factors which might account for distortion is present. To illustrate, a patient may have an anatomic shortness of 1 inch of the right leg and a scoliotic curvature of the lumbar spine to the right. If, when the film is taken, the patient's entire trunk is turned slightly to the right, this can be recognized by the rotation of both the pelvis and lumbar spine to the right. However, since the rotation of the lumbar spine exceeds that of the pelvis it is obvious that there is a scoliotic lumbar curve present. In addition, it is apparent on the film that since there is a total trunk rotation to the right the right femur has been moved closer to and the left femur farther from the film. Thus, it can be seen that the apparent leg-length discrepancy shown on the film is greater than the actual discrepancy between the femur head heights. It must be stressed, however, that interpretation must be in terms of estimates since mathematical precision is not possible where the exact relationship of each part of the osseous framework of the patient to the tube and film (a requirement for determining magnification) cannot be determined.

CONCLUSIONS

1. Conventional x-ray equipment can be used to make satisfactory weight-bearing studies of the axial skeleton.

2. The use of a standardized position of the patient in relation to the equipment is necessary; this position should include a 6-inch interfoot space.

3. The x-ray technic involved in each examination must be carefully recorded to permit interpretation of magnification and distortion factors and to provide a basis for comparison with follow-up studies.

4. The configuration of the various structures and the anatomic relationships of joints of the axial skeleton remain essentially the same for long periods in adult patients whose physical condition and general health remain relatively unchanged. Hence, properly taken x-ray films show repeatable findings when the state of the patient is relatively unchanged and provide valid information concerning improvements or regressions in skeletal structure which are associated with changes in the patient's condition.

Acknowledgments

It is with deep appreciation that we acknowledge the counsel and advice of George W. Rea, D.O., and I. M. Korr, Ph.D., and the suggestions and comments of the many osteopathic physicians who read the preliminary drafts of this paper.

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The Halladay Flexible Spine

Preliminary Report

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Need of a method which would allow study of the range and characteristics of motion of the spine as a whole and between individual vertebrae led Dr. H. V. Halladay, during the years prior to 1920, when he published his text, "Applied Anatomy of the Spine," to experiment with preservation of spines with the ligaments and cartilages intact and retaining resiliency comparable to that found during life.

The method which Dr. Halladay developed was, under the auspices of the Board of Trustees of the American Osteopathic Association, taught to representatives of the anatomy departments of the osteopathic colleges.

In order to demonstrate that Dr. Halladay's method is reproducible, flexible spines have been prepared in the Department of Anatomy of the Philadelphia College of Osteopathy, according to his directions. Under prescribed storage conditions the specimen does not readily deteriorate.

PURPOSE

The desirability of flexible spines for teaching and research is great, for they provide possibilities not approached by any other method. Such specimens are necessary for the proper study and demonstration of total, regional, and intersegmental motion; for a clearer and more accurate understanding of the physiologic motions of the spine; and for study of the mechanical principles through which they operate.

METHOD

In the preparation of flexible spines at the Philadelphia College, the directions of Dr. Halladay were followed closely. One variation was made in the technic of body covering in that during dissection a double thickness of oilcloth was used in place of quilting, as used by Dr. Halladay.

Excerpts from Dr. Halladay's description are given below:

In order to demonstrate average movement of the spine we must have specimens that are not over thirty-five years of age and who have died of some condition that has not affected their joints. The body must not be embalmed with any commercial fluid or preparation for preliminary embalming that contains formalin. The body must be secured as soon after death as possible so that the blood can be drained as the fluid is injected. If the blood is clotted in the deeper parts of the body the fluid cannot get to the ligaments. One gallon of the formula No. 1 is injected as soon after death as possible and, upon arrival at the laboratory, two more gallons are injected under nine pounds of pressure. We used the gravity system, the glass container suspended four feet above the body. The body is covered and allowed to absorb the large amount of fluid for 40 to 48 hours. One additional gallon is then injected. If the subject being embalmed is heavy the third injection should be two gallons instead of one. Following this last injection the skin will not look natural. The body is covered, and when the skin begins to shrink the dissection may be started.

Quilted pads are used around the body during the dissection to exclude as much air as possible after a cotton sheet has been wrapped around the body. The sheeting is saturated with formula No. 2. During the dissection the body should be kept moist with formula No. 2.

All fat is saved for use after the dissection is completed. It is run through a grinder, and the oil strained off. Two ounces of oil of cloves are added to each pint of fat obtained. The fat thus obtained is painted on each joint with a brush daily for the period of one week. It is essential to use the fat from the body dissected. Occasionally additional painting with the fat solution may be required for a month. The specimen should be stored in a special container built like a humidor.

FORMULAE

The formulae are given below. The center column shows the measurements as supplied by Dr. Halladay, and the third column shows the conversions for these measurements.

Formula No. 1

Arsenous acid	1 oz. troy	or 31.103 grams
Carbolic acid 5%	10 oz. (U.S.fl.)	or 300.00 ml.
Mercuric chloride	1 oz. troy	or 31.103 grams
Chloral hydrate	8 oz. troy	or 248.824 grams
Alcohol 95%	3 qts.	or 2838.975 ml.
C. P. glycerin	2 qts.	or 1892.650 ml.

Make up to 4 gallons with distilled water.

The arsenous acid, mercuric chloride, and chloral hydrate are dissolved in a small quantity of distilled water in a glass bottle, which must be kept tightly corked and in a cool place.

Formula No. 2

C. P. glycerin	1 pt.	or 473.626 ml.
Mercuric chloride	1 oz. troy	or 31.103 grams
Alcohol 95%	1 pt.	or 473.1625 ml.
Carbolic acid 5%	2 oz.	or 60.00 ml.

Make up to 1 gallon with distilled water.

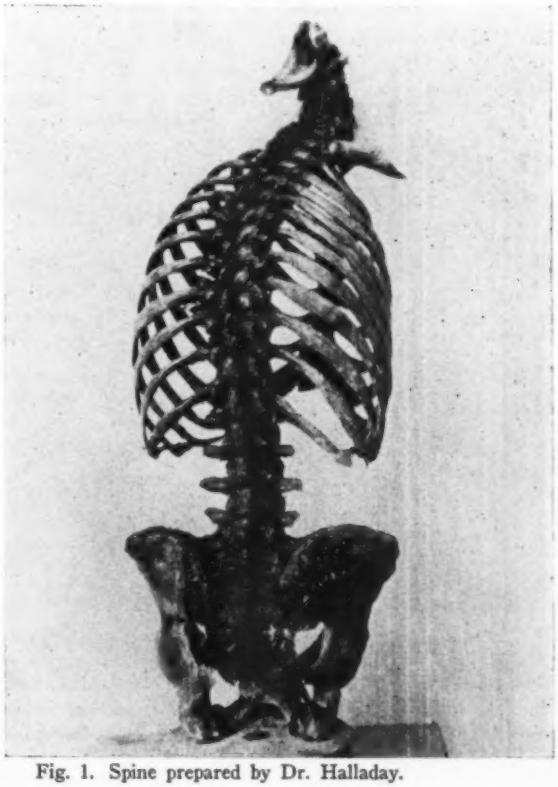

Fig. 1. Spine prepared by Dr. Halladay.

Formula No. 2 is used externally for keeping the body moist.

Metal tubes or containers must not be used at any time during preparation.

DISSECTION METHOD

Because of the corrosive nature of the fluid, a slate-top dissecting table is the most satisfactory.

It is necessary to retain as much fluid as possible in the tissues during the dissection. For this reason the tissue flaps should be as large as practicable and deeper than those used in the standard dissection; they should include the skin and the tela subcutanea.

The spine is the first part to be dissected so blocks are placed under the shoulders to protect the anterior thoracic wall from changes due to pressure.

Posterior Longitudinal Incision.—This incision, which is made ½ inch lateral to the midspinal line in order to prevent cutting the supraspinous ligament at the initial incision, extends from the lumbosacral junction to the occipital region, immediately above the superior nuchal line.

Transverse Incisions.—These incisions are made as follows: (1) Bilateral transverse incisions extend from the upper part of the posterior longitudinal incision above the superior nuchal line to the base of the mastoid process. (2) Bilateral incisions extend from the spinous process of the fifth lumbar vertebra following the iliac crest to its highest point. (3) Bilateral incisions extend from the spinous process of the seventh cervical vertebra to the tip of the shoulder. Three transverse incisions allow two large flaps, which should include the superficial fascia, to be reflected on each side.

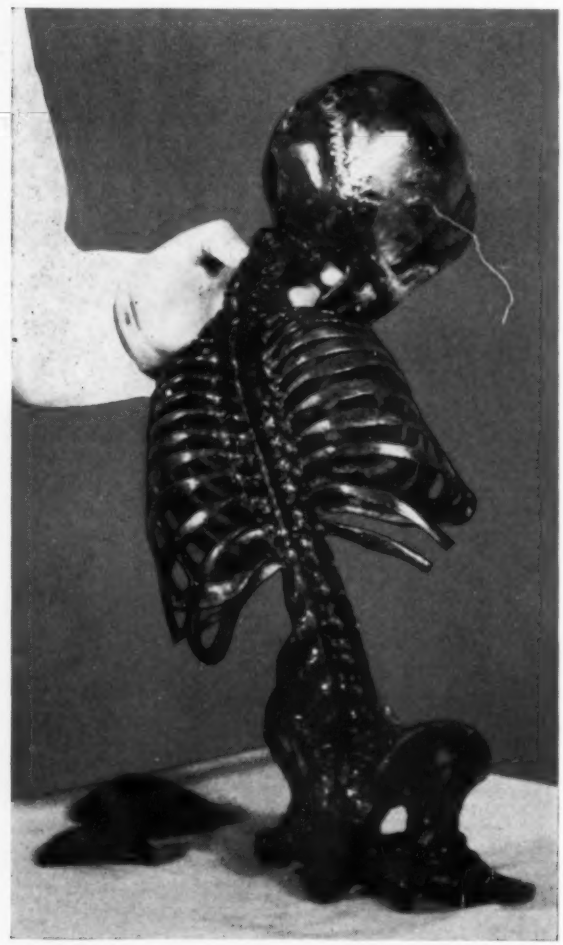

Fig. 2. Spine, with skull attached, of 6-year-old female, prepared in the Anatomy Laboratory of the Philadelphia College of Osteopathy. One opening can be seen in the left occipital region.

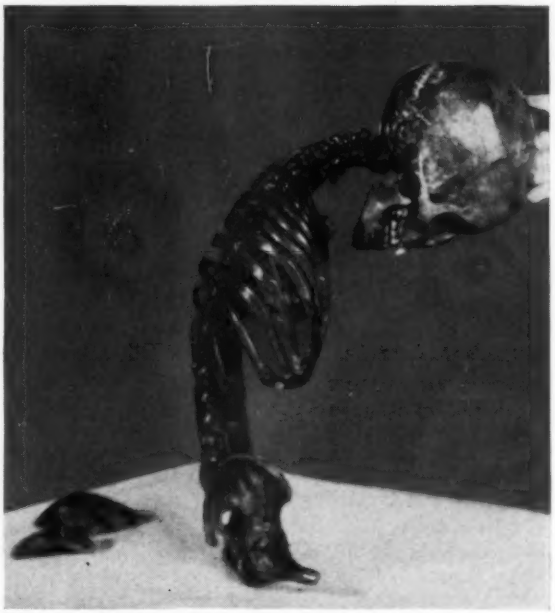

Fig. 3. Same spine as in Figure 2, shown in forward bending. The two bone sections on the table are those removed from the left frontal and parietal regions.

Deep Longitudinal Incision.—This is made immediately lateral to the tips of the transverse processes but only in the region being dissected at the time. The first region is the thoracic, where the incision must not be deep enough to disturb fibers of the most lateral part of the costotransverse joints. The muscles are then dissected from lateral to medial, as far as the junction of the laminae with the spinous processes. This stage of the dissection of the thoracic region is followed by exposure of the supraspinous and interspinous ligaments from the midline (apices of the spinous processes) to the junction of the spinous processes with the laminae, where the two deep muscular reflections meet.

Cervical Region.—This dissection should be carried out from the lateral aspect of the transverse processes toward the articular pillar and the spinous processes cleared of soft tissue. Care must be taken not to open the posterior part of the capsular ligaments.

Lumbar Region.—This area is dissected last in order to retain as much of the injected fluid as possible. The posterior layer of the lumbodorsal fascia is reflected bilaterally after incisions have been made on either side of the spinous processes, thus preserving the supraspinous ligament. The deep muscles are cleared from medial to lateral since the danger of disturbing the iliolumbar ligament is less than would be the case if lateromedial dissection was carried out.

Incisions and Dissection of the Posterior Aspect of the Sacrum, Coccyx, and Innominate Area Including the Sacrotuberous Ligament.—

Three incisions are necessary. An incision is

(Continued on page 677)

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THE NATURE OF MODERN MEDICINE

In a recent editorial[1] discussing the Salk poliomyelitis vaccine, THE JOURNAL posed three questions directly related to the import of such a discovery: What occupies the central position in modern medicine? Is the discovery of Salk vaccine and others akin to it of such significance as to embrace all that is pertinent to the comprehension, diagnosis, care, and control of disease? Does the entire philosophy of modern medicine, or rather the absence of a philosophy—except in osteopathic medicine, need to be re-examined?

In the same editorial it was pointed out that the story of medicine as it is now presented, either to physicians or to the public, is typically through a journalistic approach—one that commands attention by focusing on matters rarely deserving primary concern, or not basically related to future developments that are fundamental in nature. Professional literature directed to the doctor and periodicals and newspapers intended for lay consumption hail a procession of diagnostic and curative aids that appears endless.

The physician is called upon to exercise a nice sense of discrimination between what is medically passé and medically timely. Confined within the bounds of a medical practice that is entirely concerned with the curative and the remedial, the doctor first asks himself: "What has he got (he being the patient)?" The diagnostic laboratory supplies the answer. A second question follows in immediate sequence: "What is good for it?" That answer is at hand, for the pharmaceutical house has already advised him what he should use for such a case. It is not surprising that critics of modern medicine have pointed out that the doctor is becoming increasingly a middleman—the laboratory makes the diagnosis, the pharmaceutical house provides the treatment. Sydenham, MacKenzie, Osler, Cabot, of whom thought was required, were born too soon! What was once the exercise of a great and subtle art is now properly described as largely "the judicious exercise of neat discretions, the knowing selection of the appropriate ones from among a host of available tests and remedies."[2]

The physician today possesses a fixed and a comfortable orientation: What does the patient have and what shall I give him? Such it is that occupies the central position in modern medicine. And with that position both he and the public are presently content.

Why should the physician not be satisfied with modern medicine? Beyond doubt, achievement and triumph characterize it. Discovery after discovery—from Jenner to Salk—has become a specific weapon for a frontal attack against a disease. The battles have been glorious, the victories tremendous, and they have been fought and won within such historical recency as to give no sense of the failure inherent in modern medicine. True, the start was slow. Between successful inoculation against smallpox (1796) and inoculation against rabies (1885) almost a century elapsed. Although Jenner's empiricism, like so many of man's leaps to knowledge, remains awe-inspiring, it is Louis Pasteur to whom credit must be given for proving the transmission of diseases by infective (specific) organisms (1877) and laying the foundation for immunization against these same diseases by their use in attenuated forms. The name of Koch should also be coupled with that of Pasteur in any consideration of specific etiology. It was at this time that Robert Koch discovered the method of isolating micro-organisms on solid media, a procedure essential to the development of the immunization program. Within a generation of Pasteur and Koch the bacterial cause of a dozen great diseases had been discovered—actinomycosis, gonorrhea, typhoid, diphtheria, tuberculosis, glanders, cholera, tetanus, anthrax. There followed for prophylactic and therapeutic use antitoxins and antisera for many of the diseases.

In 1925 Sir George Newman,[3] speaking in Edinburgh as President of the Society of Preventive Medicine at its annual congress, referred to the 50 years previous as a "golden age of medicine." Quite rightly he saw it all as a part of a ". . . glorious chapter of quest and conquest which moved the center of gravity from environment to infection." Sir George made a further observation to the effect that ". . . the conditions of person and environment, the lack of resistance, which favored those agents" also occupied the center of gravity along with the causational agents themselves, a statement that was not only illogical but contrary to fact. Etiological medicine from the time of von Behring (circa 1892) has made no concession to ecology (man's ability to adapt to his peculiar total environment). A specificist medicine is monolithic in its belief and effect, or to use a political metaphor, it is totalitarian.

1. Editorial: Salk poliomyelitis vaccine. J. Am. Osteop. A. 54:531-532, May 1955.

2. Galdston, I.: Meaning of social medicine. Harvard University Press, Cambridge, Mass., 1954, p. 94.

3. Newman, G.: Cited by Galdston, I.: *Op. cit.*, ref. 2, p. 56.

Were Sir George speaking in 1955, the conquests to which he could refer would be many more. By now germs have been so well tracked to their lairs that medicine's newest achievements have no longer as much to do with specific causalities as with specific therapies. But the mounting list of chemotherapeutics and antibiotics, representative of these conquests, still has to do largely with the diseases which man "catches," that is, with the specific noxious agents which invade man. And these diseases of exogenous origin have served as a foundation for the entire structure of modern medicine, giving it the appearance of being built upon bedrock.

It cannot be said, however, that medicine's victories are entirely confined to conquering the inimical forces which assail man from without (bacteria, viruses, gross parasites). Other achievements of modern medicine relate to body lacks or requirements, items in the endocrinologic and nutritional fields. Thyroxine was isolated in 1915, insulin in 1921, and parathyroid and adrenal cortex extracts, the male and female sex hormones, and the pituitary hormones in the years that followed. All these biologics are essential to the maintenance of the inner world of man. Likewise our knowledge of food essentials, of vitamins, of minerals, and of trace elements belongs to a different kind of achievement than that of vaccines, sera, and antitoxins. But even these categories (nutritional and endocrinologic) still leave modern medicine founded on specific etiology and specific therapy. Its primary concern remains what to do for what.

To cite the obvious: An etiological medicine which successfully handles the problem of diabetes has in no sense attacked the cause of the disease. Modern surgery, which stops with repair and which removes that which it cannot replace, seems scarcely conscious of its own limitations. It is not only heretical to suggest that modern medicine and surgery, as exemplified by medical education and research, have neither a sense of direction nor a realism sufficient to serve man's needs, but also it smacks of the crabbed critic and the crackbrain. He who questions that all medical truth is within a specific etiology for which there is a specific therapy or one awaiting discovery is suspect. Seventy-five years ago certain great leaders of German medicine and the nineteenth century founders of modern specificist medicine were locked in a bitter debate over medical philosophy. The specificists in diagnosis and therapy won. Today there is no philosophy of medicine and any attempt to formulate one is denounced as "cultism." Etiological medicine has become completely triumphant.

Only objectivity is viewed with the respect accorded science. Hahnemann is pointed to as a horrible example (if given any recognition) of a medicine gone wrong, or as the last of the arm-chair philosophers who "talked" medicine. Since Andrew Taylor Still's position in medical history is purely a derogatory one, he is not mentioned. By the time the medical movement which he founded was under way, the cultist brand had been forged and applied by the American Medical Association—the effective agency of an etiological medicine organized to achieve political goals.

The student will find little help toward an understanding of the origin of modern medicine. The great philosophical battles of the European giants (the ecologists and specificists) are mentioned in medical histories only to underplay and disparage the conflict. Medical history seems to have been as effectively rewritten as political history is said to be today, yet truths effectively covered up have begun to emerge again.

But the nature of modern medicine is crystal clear. It is rigidly etiological. As Korr[4] succinctly puts it:

> In the allopathic view disease is equated with the pathogenic agent; disease is produced by the action of a given pathogenic agent and is characteristic of that agent. In short, there are as many diseases or kinds of diseases as there are "etiologies."

Stated negatively, modern medicine is nonecological—that is, it is little concerned with man's ability to adapt to his peculiar total environment which includes his fellow men. The presumptions of modern medicine, since their first postulation by scientists at about the mid-nineteenth century, have paid off so gloriously (for mankind) that today modern medicine has no sense of error, let alone failure.

The questions asked in these editorials are readily answerable. The central position in modern medicine is occupied by a medicine that is specifically etiological and therapeutic. The discovery and development of the Salk vaccine, and others akin to it, is of such significance as to embrace all that is pertinent to the comprehension, diagnosis, cure, and control of disease as viewed by etiological medicine. And finally, the absence of a philosophy of medicine as a chief characteristic of modern medicine does need re-examining. This re-examination is called for because modern medicine as it is conceived, taught, and practiced has failed at a time when its triumphs, victories, amazing achievements, and continuing new wonders have reached a new height.

THE JOURNAL proposes to study the paradox present in modern medicine: Amazing achievements and undeniable triumphs have given it an enviable prestige, yet it holds within itself the seeds of its own failure. Its superstructure is built with scientific precision and accuracy, but its foundation is without depth.

Osteopathy continues to be branded with the cultist stigma by the agency that speaks for American medicine. The invalidity of the stigma does not alter the fact that it remains as a barrier to the osteopathic profession's wider social usefulness. The next step in combating our critics is to gain a comprehensive understanding of the nature of modern medicine, to seek out the roots of medicine (from which both the osteopathic and the medical professions spring), and to acquaint ourselves with the point of view of the occasional severe critics of today's medicine who are scientists and physicians of established worth. Then only will we be prepared to examine the nature of osteopathic medicine and state it clearly that all may know. And this is our greatest challenge today—that we demonstrate our worth to society.

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VERTEBRAL MECHANICS

J. S. DENSLOW, D.O.*

Clinical observation in osteopathic practice appears to have established the fact that effective manipulation applied to the musculoskeletal lesion† frequently involves forces which produce some degree of joint movement, and at times apparently, some alteration of joint position, with an accompanying reduction in periarticular and muscular rigidity and hyperesthesia, and frequently with amelioration of visceral dysfunction or disease. This, together with the demonstration that the musculoskeletal lesion is characterized by a lowered reflex threshold,[1,2] and in many instances by segmentally related hyperactivity of the sympathetic nervous system,[3,4] has established a widely accepted working hypothesis. This hypothesis is that the musculoskeletal lesion is, in part at least, reflex in nature, with the abnormal afferent bombardment of the reflex arising either (a) from abnormal joint weight stresses and asymmetrical limitations of movement, (b) from imbalances in the tension of the periarticular tissues of the joint which result from factors of visceral or psychogenic origin or are associated with abnormal constitutional states, or most probably, (c) from a combination of both.

This suggests, at least, that (a) "normal" joints have a certain position, range of motion, periarticular tension and pain threshold; that (b) joints which are directly or indirectly involved in musculoskeletal lesions have different positions, ranges of motion, periarticular tensions, and pain thresholds. This suggestion has led in part to the implication, widely accepted, that the "normal" joint at least approaches the theoretical ideal, with a certain structural configuration, alignment, and movement, while the musculoskeletal lesion is considered in part at least as an abnormality of joint position and movement with the lesioned joint itself being described as "rotated, lateral flexed, flexed or extended," and as having a limitation of movement in one or more of these directions.

On the basis of this reasoning the clinical improvement which so often follows manipulative treatment, particularly when the treatment involves breaking "joint seals," has been explained rather loosely as a "correction" of the abnormal position with a restoration of normal movement in the lesioned joint.

Within the osteopathic profession, however, the evaluation of the musculoskeletal lesion, and the results of manipulative treatment, have come under more objective scrutiny, both in clinical practice and in the research laboratory. Under such scrutiny it has become more and more apparent that the theoretically ideal symmetry of vertebral joint structure, position, and motion rarely, if ever, exists and the positional relationships of musculoskeletal lesions are not, in themselves, of exclusive importance, since in many instances, joints may be manipulated successfully and with clinical effectiveness without discernible alteration in their position. Hence, it seems that the concept that the musculoskeletal lesion represents an abnormality of joint position or symmetry, which is "corrected" in the course of manipulative treatment, is at least partially invalid and requires further analysis.

It does not necessarily follow that the positional relationships are unimportant, since effective manipulative treatment apparently increases the range or the ease of movement, or both, in the musculoskeletal lesion, and certainly the movement of a joint is influenced by the anatomic relationships of the joint. It would seem, instead, that the static positions and the dynamic movements of joints, which are actually different phases of the same mechanism, should be considered and studied together, as important components of the musculoskeletal lesion complex.

To do this we must identify the various types and characteristics of this positional and movement mechanism as a base from which to continue studies of the role this mechanism plays in "influencing and being influenced by" the total body economy. In other words, we need to find out what structural characteristics, what anatomic relationships, and what motions actually do occur before we can correlate these phenomena with other normal or pathologic situations.

For a period of several years studies have been in progress in this laboratory to secure information concerning the anatomic relationships and movement characteristic of joints, which can be taken in context with facts concerning the periarticular tissues, to assist in placing the diagnosis, selection of treatment, and prognosis of the musculoskeletal lesion, and all that they imply in the total care of the patient, on a more sound and objective basis. Such facts are being sought in both laboratory and clinical investigations in this College and are rapidly mounting in the literature which reports the findings of studies being carried on in other institutions throughout the world.

The findings of the studies being carried on in this laboratory will be reported in a series of papers. The first paper, published in this issue of THE JOURNAL, deals with methods of taking and interpreting roentgenograms which are made to study anatomic relationships and movement characteristics of the joints of the axial skeleton.

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†From its very beginning the osteopathic profession has been characterized by its recognition and management, frequently by manipulative treatment, of a clinical entity involving the supporting framework of the body. A comment concerning this entity was developed by a group in this College in connection with a broad statement titled "The Osteopathic Concept" which was prepared as a "tentative formulation of a teaching guide for faculty, hospital staff and student body."[5] This comment is as follows:

> "The disturbances originally described by Still have been variously named: osteopathic lesions, vertebral lesions, Still lesions and subluxations. The most nearly adequate term for these abnormalities appears, at this time, to be musculoskeletal lesion."

In this and in other papers in this series the entity referred to above will be identified as "the musculoskeletal lesion."

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Notes and Comments

Notes on an Old Plague.—

The American physician has noted with great satisfaction the reduction of tuberculosis to a less important position than formerly in this country. Unfortunately, despite its decline it is still important in this country and is one of mankind's most serious plagues in most of the densely populated portions of the world. Dr. Esmond R. Long, retiring director of medical research of the National Tuberculosis Association, discusses the tuberculosis bacillus in an article in the June, 1955, *Scientific American*. In this article Dr. Long calls attention to the fact that despite long and intensive investigation, we still do not know why this organism is virulent; we know many differences in characteristics of virulent and avirulent organisms, but the significance of these differences is still unknown. Modern chemotherapy has given hope, but to date no decisive victory. Dr. Long leaves a hopeful note in the statement

> . . . the battle against tuberculosis is slowly being won. Possibly chemotherapy will merely strike the *coup de grâce* in a long struggle in which the human body itself has adapted to defeat the parasite. Just as the bacillus becomes resistant to man's drugs, so man has become more resistant to the bacillus through his own mutations. The human stocks most susceptible to tuberculosis were wiped out long ago. As the survivors, we, like drug-resistant bacilli, are better equipped for the struggle.

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"Practical" and "Impractical" Research.—

"In this present era, the common man holds the purse strings that control medical research," says Charles A. Janeway, M.D., of Boston, in *The Journal of the American Medical Association*, April 9, 1955. Dr. Janeway, discussing "Pediatric Research in the Age of the Common Man and the Exceptional Child," points out that pediatric research has received an impetus of sorts from the sympathetic appeal which the handicapped child presents, but that it is mostly channeled into research concerning specific diseases, saying, ". . . the dedication of research funds, obtained from the public either by taxation or by popular appeal, is mainly to the cure or prevention of a specific disease or group of diseases."

With the relative decline of funds available from endowments or large donations for research purposes, funds collected by taxation or contributions to organized charities become increasingly important in the medical research picture. The development of the atom bomb seems to have convinced the common man that any problem can be solved if enough money is spent on it, and the various specific fund-raising organizations have, perhaps unwittingly, fostered this attitude. At the present time, it would seem that the general feeling is that the amount of time required to solve a research problem will be in inverse proportion to the amount of money applied to it. Up to a point, this can be demonstrated as being true, but unfortunately that point is far short of what people would like it to be.

Many practicing physicians have been struck by the success, if not the results, of fund raising for the eradication of some disease which they know to be singularly uncommon in their experience and probably unimportant to the nation as a whole, however devastating it may be to its unfortunate victim. They will probably have noted the paucity of work being done on the effects of diseases like measles which are too common and apparently too benign to have a stimulating effect on the public imagination. It is also discouraging to note the scant attention being paid to basic or "impractical" research, which, of course, is the foundation upon which all applied or "practical" research must be built.

Dr. Janeway concludes that his article is

> . . . a plea for the whole, for the recognition that research is part and parcel of the total academic medical enterprise. To the extent that this new type of support for what medical schools are doing undermines the basic academic principles of tenure and freedom, to the extent that it forces medical research into channels where lay people think it ought to go rather than allows it to flow where the ground swell of basic scientific advance and the imagination of free and creative investigators takes it, it can hurt medical education and the very cause for which the funds were obtained, the promotion of health and the conquest of disease.

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Cerebrovascular Accidents.—

Sir Winston Churchill's temporary retirement from public life 2 years ago was evidently enforced by paralysis following a cerebrovascular accident. This is of some importance to physicians because of the high degree of recovery which was achieved in his case. The feeling of hopelessness and the miasma of fear which seem to surround these cases is well known to practicing physicians and are so thoroughly embedded in the modern medical folklore that effective refutation to the patient and his family is well nigh impossible. In a population where ever-increasing numbers of people enter the age groups in which cerebrovascular accidents occur, physicians expect to see larger numbers of this sort of incident. For this reason, anything which is of value in combating defeat is to be appreciated, and a reminder of Churchill's case to the patient and his family should be usable as a source of help.

★ ★ ★

Short Critique on Treatment.—

Occasionally a comment is made in a specialized sense which has implications that may be logically extended far outside the original field. Such is the case with one made in "Peripheral Vascular Diseases" by Edgar V. Allen, Nelson W. Barker, and Edgar A. Hines, Jr. In this work, which is reviewed elsewhere in this issue, the authors state,

> It is well to emphasize here that observations concerning the beneficial results of some particular method of treatment which are not based on observation for a long period are of little value because disturbances of the peripheral circulation tend to regress and progress, and because treatment seldom if ever consists of only one measure or method.
>
> Certainly thoughtful physicians are painfully aware that this could well be applied in all fields to the long and apparently endless parade of "specific" and "miraculous" treatments which have had such furious (and temporary) fanfare both in

the past and present. How often a treatment has come to the fore with great and overwhelming portent for the future, only to die with evidence of marked senility in a few short months!

★ ★ ★

Sickness in the "Well" Patient.—

Feeling unwell without demonstrable physical illness or obvious psychoneurotic problem is not only a common finding in patients, but is also a common problem among the physicians themselves. Sol Hirsch, M.D., discusses "The 'Well' Patient Who Feels Sick" in the *New York State Journal of Medicine* for April 15, 1955, defining its primary cause as ". . . a depletion of energy up to or beyond the body's ability to spring back." Dr. Hirsch feels that this point may be called the "level of energy expenditure" and compares it with the "elastic limit" in the fatigue of metals. An even more obvious comparison might be the inability of a rubber band to return all the way to its original size after overstretching. He speaks of "energy debt" as a result and points out that "This 'well' patient who feels sick no sooner almost achieves springback when his energy is siphoned off, and he starts hovering uncomfortably around his level of energy expenditure again."

It is common knowledge that most physicians feel chronically fatigued, unwell, or both. The demands of practice and the uncertainty of the daily schedule which ensues make the physician a prime candidate for this sort of difficulty. Indeed, it is hard to see how he can avoid it in many cases, for it is certain that the average physician lives under conditions of almost continual stress. Many have observed that he is faced with one of two problems most of the time—he is either so busy that he neglects his own welfare, or he is not busy enough and consequently is likely to be in sufficient financial difficulty to be subjected to stress from that direction.

It is self-evident that under the present-day conditions of practice no complete solution to this problem is forthcoming. It is also self-evident that with the gradual aging of physicians as a group some solution must of necessity be found. A partial solution, possible though difficult of attainment, is to be found in ". . . rest is not the most important feature of therapy, nor is work, nor is exercise and play. What is imperative is that into each day must go the rhythm of work and rest and play (with exercise) and rest. What is even more imperative is that the rhythm must be suited to his very own level of energy expenditure."

★ ★ ★

Household Poisons.—

The day is past when one could feel that the children would be safe from poisoning if the kerosene and lye were kept out of their reach. Today a tremendous number of poisonous products are available in the home, many of them products which have moved from the industrial plant where the problems of their use were known, to the home where these problems are not known. Many of them are pleasant looking and pleasant smelling, as is to be expected in a competitive market. Their unpleasant tastes are no protection, as anyone who has dealt with children is painfully aware that taste means practically nothing at all to the child who is bent on eating or drinking something he is not supposed to have. *International Medical Digest* for May, 1955, abstracts an article by Morton J. Rodman published in the *Journal of Pediatrics* for February, 1955, which points up this problem in some detail.

THE HALLADAY FLEXIBLE SPINE—CATHIE

(Continued from page 672)

made immediately lateral to the midline from the lumbosacral junction, where it is continuous with the initial incision, to the lower limits of the coccyx. Bilateral incisions are made from the highest point on the iliac crest to the upper part of the thigh, passing lateral to the tuber ischii. The skin flap thus outlined is deepened so as to include the tela subcutanea and the most superficial part of the gluteus maximus and medius muscles and then carried downward. Dissection is carried out from the midspinal line in a lateral direction over the sacroiliac region, downward along the sacrotuberous ligament. The upper attachment of the biceps femoris muscle should be left in order to show its connection with the sacrotuberous ligament.

Beyond the limits of the attachment of ligaments, the periosteum is removed. The essential dissection of the posterior aspect is now completed.

The soft tissue masses are replaced over the dissected region after each dissection session, and moistened with formula No. 2; the skin flaps are pinned together with safety pins and bound with muslin bandages moistened with the same formula. The soft tissues and skin of the back are left in position until work on the anterior aspect is completed.

Anterior Dissection.—

The body is turned on its back and an anterior incision made along the midsternal line from the jugular notch to the tip of the xyphoid process. From this point the incision follows upward and lateralward along the lower border of the pectoralis major muscle to the axillary region. From this incision the skin, fascia, and pectoral muscles are reflected laterally. The pectoralis minor is cut from its attachment on the anterior thoracic wall. Disarticulation of the clavicle at its sternal end and freeing of the clavicle from the muscles holding it to the thorax and neck permits the upper extremity to be removed. The shoulder girdle is, of course, taken with the arm attached. The muscles of the extremities are left intact until dissection of the extremity is carried out; meanwhile they should be wrapped as previously described for the spine. The intercostal spaces are next cleaned from before backward so that pressure will not be brought to bear on the unsupported thoracic wall.

The muscular wall of the abdomen is removed and the viscera freed from their attachments. Removal of the thoracic viscera awaits the removal of the abdominal viscera, the psoas major, and the quadratus lumborum muscles. The diaphragm is removed, and the structures passing through the thoracic inlet are divided. The thoracic viscera are then removed through the thoracic outlet.

The cervical region is placed in backward bending while the anterior cervical structures are dissected.

The Head.—The occipital bone is left attached to the spine so that the ligaments of the craniospinal

junction will not be displaced. Only the occipital bone was left attached to many of the original spines, and that technic has been followed in the preparation of the spines at the Philadelphia College with the exception of the one shown in Figures 2 and 3. In this specimen the cranial bones were all retained. Windows were made in the parietal, frontal, and occipital bones on one side for the removal of the brain. They should not be cut until all other work on the preparation is completed. This method leaves the falx cerebri, tentorium, and falx cerebelli in place with the dura of the opposite dorsolateral region.

Completion of Specimen.—The completed specimen should consist of all osseous parts of the spine and pelvis and the occipital bone (or all the cranial bones) together with the ribs, sternum, and costal cartilages. The ligaments connecting all these structures are retained. All soft parts are discarded except the fat, which is prepared as described above and then used to paint the specimen daily for 7 days. The application should then be repeated twice a week for a month. Following each application, the spine should be put through its range of motion.

Storage.—A special plastic container was made for the spines prepared at the Philadelphia College, but it appears that the humidor type of container recommended by Dr. Halladay excluded air more effectively. If a metal storage case is used, zinc is the most satisfactory material for its composition.

CONCLUSION

The preparation of human spines by the Halladay method has been found satisfactory in all respects, and indications are that it can be used for subjects of all ages. To date it has been used on three subjects 6, 26, and 30 years of age and on one full-term newborn infant.

Much valuable information regarding the fascia of the body can be obtained while dissecting subjects embalmed with this formula since it allows a clearer concept of the soft tissues. Incisions and dissecting technic must be changed to meet the requirements of the structure of the parts being studied.

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1954 LICENSING STATISTICS OF STATE BOARDS OF MEDICAL EXAMINERS

The May 28, 1955, issue of *The Journal of the American Medical Association* is the annual State Board Number which presents statistical information regarding the issuance of licenses to practice medicine and surgery by the various boards of medical examiners. The publication of these statistics is a valuable source of information regarding the practical administration of medical practice acts. The statistics, insofar as they are complete, annually verify the conclusion that the boards of medical examiners do not have any basic medical educational standards which are followed uniformly throughout the country. The applicants for licensure may come from such a wide assortment of medical colleges, totaling more than 600 and scattered all over the world, including such countries as the Union of Socialist Soviet Republics, as to leave the reader with few illusions concerning the ability of boards of medical examiners to know the quality or quantity of medical education in the various colleges which train doctors of medicine licensed in the United States.

Doctors of osteopathy were examined by boards of medical examiners in the year 1954 in eleven states: Colorado, Connecticut, Delaware, Indiana, Massachusetts, New Jersey, New York, Ohio, South Dakota, Texas, and Wisconsin. While not reported in the State Board Number, a number D.O.'s were also examined in Kentucky by the State Board of Health. In all, 234 D.O.'s were examined; 195 (83.4 per cent) passed the examinations and 39 failed. In three states there were no failures by doctors of osteopathy. These figures compare favorably with those concerning graduates of medical colleges: 95.8 per cent of graduates of approved medical colleges passed, 57.4 per cent of graduates of foreign medical colleges, and 35.6 per cent of graduates of unapproved medical colleges. While the percentage of graduates of medical colleges in the United States passing was 95.8 per cent, five of these colleges had percentages of passing below that of osteopathic colleges, namely, Boston University School of Medicine, Tufts College Medical School, New York Medical College, Southwestern Medical School, and the University of Vermont. Graduates of 183 foreign medical colleges took the examinations in the year 1954, and out of this number only twenty-three foreign medical colleges had a passing average equal to that of the general average established by graduates of osteopathic colleges.

During the year 1954, 85 D.O.s were licensed by boards of medical examiners by reciprocity or endorsement in twelve states. The number of licenses issued annually by this method appears to be on the increase. In the last 5 years 316 medical licenses have been issued by the boards by either reciprocity or endorsement. This number, however, is small compared to the number of doctors of medicine so licensed each year by these methods. In 1954, 8,117 licenses were issued to M.D.'s by reciprocity or endorsement, while only 5,748 were issued by examination.

A large percentage of graduates of U. S. medical colleges, the statistics reveal, are licensed annually upon presentation of a certificate from the National Board of Medical Examiners. In some states all but a few current graduates are licensed by this method and thus never are examined by an officially constituted governmental licensing agency. In 1954, 3,410 licenses were issued on the basis of certificates of the Board of Medical Examiners. The state issuing the largest number was New York with 954; followed by California, 434; Massachusetts, 322; Pennsylvania, 300; Connecticut, 173; New Jersey, 162; and Maryland, 102. The wide use of this method of licensing doctors of medicine is shown by the fact that in the year 1954 some medical schools had as few as 5 or 6 graduates who took state board examinations. For example, while the medical colleges in New York State alone graduate over 800 annually, only 200 took state board examinations in 1954, the remainder being licensed by the use of the certificate of the National Board of Medical Examiners.

The statistics published pertaining to the adminstration of the twenty-one Basic Science laws did not, for the first time, give passing and failure rates for the graduates of the various schools of medicine. The general average of passing for all schools of practice was 81.8 per cent. In all, 3,941 basic science certificates were issued by the boards of basic science examiners by examination and 1,976 by reciprocity or endorsement, making a total of 5,917 certificates.

Probably the most valuable information published under the part of the State Board Number pertaining to Basic Science laws is a compilation of the reciprocity or endorsement policies of the twenty-one boards. This information can be extremely helpful to physicians.

Department of Public Relations

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HOOVER COMMISSION ASKS MORE RESEARCH AID

On May 20, 1955, the Commission on Organization of the Executive Branch of the Government, popularly referred to as the Hoover Commission, submitted to Congress its report on Research and Development.

The Report points out that the Federal Government through twenty-nine different agencies conducts programs of research and development, and that on the basis of the budget proposals for appropriations for the fiscal year 1956, the total expenditures of the Government for that year will be about $2,400,000,000, of which about $2,050,000,000 is in the Department of Defense and $350,000,000 by the civilian agencies. If we include the research and development carried on by our industries and nonprofit institutions, the aggregate sum probably exceeds $4,500,000,000 annually.

The first four of the five Recommendations by the Commission are directed to Defense Agencies. The fifth relates to basic research and medical research, as follows:

COMMISSION RECOMMENDATION AS TO BASIC RESEARCH AND MEDICAL RESEARCH

Basic Research

Among the Federal Agencies devoted to research and development there is but a minor amount of basic research into the laws of nature and the nature of materials. Yet the safety, the increase of productivity and the advancement of health in our Nation must come from constantly increasing knowledge through fundamental research. From these explorations come knowledge, discoveries, inventions and progress. Out of about $2,400,000,000 Federal expenditures proposed by the Budget for fiscal year 1956 on research and development work, probably less than $130,000,000 is to be devoted to Basic Research. Of this, the Defense agencies probably expend about $77,000,000.

Medical and Health Research

Of all the special research and development activities inside and outside the Federal Government, the most beneficent to mankind has been in medical and health research. Basic research in these fields covers such subjects as anatomy, physiology, biochemistry, bacteria, viruses, their contagions and their control.

We are concerned over the fact that many private foundations devoted to research and education have in the recent past tended to deemphasize their medical programs. The Congress, of course, has not, nor should it have, the right to tell our great foundations, who probably have an aggregate income of over $500,000,000 annually, how their programs should be conducted. However, as these private funds are diverted from medical research and medical education, appropriate increases in Federal appropriations may well be inevitable.

We are greatly concerned over the inadequate public and State support of our medical schools where our research technicians are trained and an important part of basic medical research is carried forward. No greater instance of university research need be cited than the dramatic accomplishment at the University of Pittsburgh by Dr. Jonas Salk in basic research which produced the polio vaccine. The universities have contributed much to understanding and alleviation of mental diseases, cancer, and many other fields. The National Fund for Medical Education, which raises about $2,000,000 annually to support the medical schools, has repeatedly stated that these institutions in the United States are carrying an aggregate annual deficit of $15,000,000, which in the instances of university medical schools must be made up by diversions from other branches of education. One consequence is that the medical schools are compelled to restrict the amount of their research, and the number of their students. The Nation is today short of both technicians and doctors. And there are today a large number of youths who have completed their premedical education and cannot find admission to medical schools.

We cannot afford stagnation of our medical research in our medical schools or the training of our technicians. In the Federal Government research is supported as an incident to other duties by the Defense services, the Atomic Energy Commission, and the Department of Agriculture. It is one of the major functions of the Department of Health, Education, and Welfare.

The actual Federal expenditure applicable to basic research in the medical field is only about $18,000,000, or less than 1 percent of the total Government Research and Development expenditures.

The Report of this Commission on Federal Medical Services, together with our task force report, have outlined constructive steps toward better organization and support in this field.

It should be noted that, although the Congress has treated appropriations requests for medical research and development generously, there are still many approved projects which have not been undertaken because of the lack of funds. These projects, primarily in the field of basic research, have been approved by several important research agencies.

An instance is the so-called "backlog" of 723 projects totaling about $7,400,000 which the National Institutes of Health predict will not be undertaken by them in fiscal year 1956 because funds have not been requested by the Department of Health, Education, and Welfare or the Bureau of the Budget. Of this amount, about $1,900,000 is for basic medical research.* We are concerned over the apparent failure of the executive branch to indicate these "backlog" projects to the Congress. That such amounts have not been recommended to the Congress or supported by the Congress may indicate a tendency to deemphasize basic and medical research. Possibly, this results from the belief that the Congress will be more receptive to requests for funds devoted to projects likely to produce startling and dramatic results. But it should be noted that there are also the dramatic accomplishments of basic and medical research.

Nor do we think that any congressional authorization or appropriation should be open-ended; if a reasonable ceiling can be established, those responsible for administering the funds will of necessity adopt some form or priority and will allocate the available funds to those projects deemed most important.

We must make sure of general support to this field which daily demonstrates such potential benefits for mankind.

We urge also that this is a problem for the Nation as a whole.

Commission Recommendation No. 5

That greater Federal support be given to basic and medical research.

*Commissioner Brownell objects to this language, because he is informed the figures submitted are merely projections for fiscal year 1956 and nearly three times the actual current figures. He is also advised that information on this subject is conveyed to Members of the Congress in the course of budgetary presentations.

Current Literature

RATIONALE AND VALUE OF TRACHEOTOMY IN SEVERE PREECLAMPSIA AND ECLAMPSIA

Experience with the use of tracheotomy in treating convulsive toxemia in 27 patients and severe preeclampsia in 6 others is discussed by Conrad G. Collins, M.D., in *Postgraduate Medicine*, April, 1955.

Albuminuria, severe hypertension, edema, and convulsions, sometimes also coma, signified eclampsia in this series. The same symptoms, except for the convulsions, indicated severe preeclampsia. Patients who did not have convulsions during hospitalization, whatever their histories disclosed, were not considered as having eclampsia.

In the past 9 years, the management of eclampsia on the Tulane Unit, Charity Hospital, New Orleans, has remained symptomatic, with few changes but for the introduction of tracheotomy late in 1950. Convulsive toxemia is treated by sedation with morphine sulfate, Sodium Amytal, Demerol, or phenobarbital, alone or combined. Oliguria and anuria are treated, like lower nephron nephrosis, with 1,000-1,500 cc. of 5 per cent glucose in distilled water, administered daily, and a quantity equal to the 24-hour urine output is added each day. Other important measures include lowering the blood pressure and ensuring an adequate airway.

Tracheotomy is used to treat laryngospasm or severe obstruction to the tracheobronchial tree and whenever the maintenance of an effective airway would require repeated or long-term aspiration. The excellent results of tracheotomy in treating severe head injuries with coma and respiratory difficulties suggested its use as adjunctive therapy for eclampsia or severe preeclampsia whenever respiratory difficulty was severe and simple methods failed to produce response, whenever there was evidence of a cerebrovascular accident, and whenever the patient was in severe coma. The technic permits immediate oxygen administration and prompt and repeated aspiration with less threat of aspiration pneumonia.

In this series, 23 patients had convulsive toxemia antepartum and four postpartum; 6 had nonconvulsive toxemia. One patient was not breathing on hospitalization, and several

were cyanotic. Respiration always improved immediately after tracheotomy. Consensus was that less hypnotics are required for sedation after than before tracheotomy or when the operation is not performed at all. The operation was performed within an hour of hospitalization in 13 patients, and the longest interval was 48 hours. The tracheotomy tube was removed from most patients by the fifth, from all by the tenth, day with neither complications nor post-tracheotomy aphasia. In no case did the operation prolong hospitalization.

When bed rest and morphine sulfate failed to control hypertension, the pregnancy was terminated. Morphine sulfate was given intravenously to speed absorption. Neither digitalis nor phlebotomy was used. Of the 5 patients who died before tracheotomy was performed, all were in severe respiratory distress; 4 died within 24 hours of hospitalization and the fifth died 4 days after hospitalization.

DRESSING FOR WOUNDS WITH DELAYED HEALING

Patients with infected lacerations, peritonitis at time of abdominal surgery, or an osteomyelitic sinus may need prolonged drainage with many changes of dressing. To avoid skin damage by repeated removals of adhesive dressings, Preston J. Burnham, M.D., has devised a comfortable, convenient dressing, described in *The Journal of the American Medical Association,* April 23, 1955.

The dressing obviates multiple layers of adhesive, applicator sticks in the tape ends, wrinkling of the tape at the abdomen, and the discomfort of both elastic and inelastic dressings. Adhesive tape is applied once, to secure all successive dressings for 10 days to 2 weeks.

With the help of a small-nose plier, lengths of No. 20 stainless steel wire are so bent as to form a central hook, resembling a clothes hook, to be used in 1-inch adhesive, or double, spaced hooks for use in 2-inch adhesive. The wire ends are then bent toward each other to fit inside the end-fold of a length of adhesive tape which has been punctured in the center or at the sides to permit the hooks (which are inserted so that they bend away from the wound) to protrude through the folded ends of tape.

The skin is cleaned with ether, then painted with two or three coats of compound tincture of benzoin, which prevents maceration and abscesses under the adhesive, increases the adhesiveness of the tape, and facilitates its subsequent removal. The lengths of adhesive are then applied to the body with the folded, hooked ends extending toward the wound and to the edge of the contemplated dressing. Ordinary elastic bands are then looped over the hooks and, stretching across the dressing, have been found to hold the dressing securely in its place, permitting the necessary changes in tension. Such a dressing has the added advantage of permitting more rapid and easier changes.

A NEW ANATOMIC GUIDE FOR SAFE LIGATION OF THE CYSTIC ARTERY

Attempts to control serious hemorrhage from the cystic artery during cholecystectomy having so often led to damage to the hepatic ducts, the common duct, hepatic artery, or portal vein, Ruben Ramirez-Flores, M.D., has worked on an anatomic landmark to guide the search for the origin and course of this blood vessel. He reports his experience in *Surgery, Gynecology and Obstetrics,* May, 1955.

Localizing the cystic artery is complicated by the obscurity of the operative field, the many variations in point of origin and course of the vessel, and distortion by inflammation of the anatomic relationships in this region. These obstacles led to concentrating on the vessel's point of entry into the gallbladder rather than on its source. The cystic artery consistently enters the gallbladder at neck level. To discern the neck despite obliterating adhesions and deforming inflammation, the author has used the 0.5-3.0 cm. organ, described by Testut and Jacob and corresponding to the cystic gland, as his guide to the cystic artery. It is located at the level of the neck of the gallbladder in the angle opposite the dilatation of the neck. In 47 cadavers, the cystic gland was always in the angle between the neck and the body of the gallbladder; 75 per cent of the time the cystic artery entered beneath the superior pole of the gland—the end nearest the cystic duct—and in 15 per cent it entered to the left of the gland, in 5 per cent 2-3 mm. to the right of the gland, and in 5 per cent on the right, coursing across the neck and arriving at the right side of the gland. Only once were the gland and the artery more than 5 mm. apart and then the artery entered the gallbladder 1.5 cm. from the cystic gland. The cystic artery also nearly always divides at the inferior pole of the gland—the end nearest the fundus of the gallbladder.

A hundred operations confirmed this picture. In 30 of the 100, the normal anatomy was obliterated by empyema or inflammation, yet in only 10 was it impossible to identify the cystic artery. The artery entered at the superior cystic pole of the gland in 70 per cent, 3 mm. from the gland in 20 per cent—to the left in 15 and to the right in 5 per cent. This picture would suggest that the cystic gland is a dependable "sentinel" of the cystic artery.

NEONATAL TORTICOLLIS

The close relationship between fibrous tumors of the sternocleidomastoid muscle in infants aged 2 weeks to 2 months and the classical muscular torticollis in children of 4 to 10 years led William B. Kiesewetter, M.D., *et al.* to study whether the abnormalities of pregnancy or delivery are causative and whether the neonatal removal of the fibroma would appreciably reduce subsequent torticollis. Their methods of study and treatment with a report of their observations and conclusions appeared in *The Journal of the American Medical Association,* April 9, 1955.

Forty-six patients, treated surgically and orthopedically for torticollis, were analyzed on the basis of tabulated information taken from hospital charts, questionnaires to the parents on the obstetric history and the child's current condition, and letters to the delivering physicians, requesting information about both the pregnancies and the labors.

Most of the children had been delivered at term, 24 of them with difficulty (with or without forceps or in breech or transverse presentation) and 2 by cesarean section. Labor had been spontaneous in 43, and, in the 30 cases that provided an accurate record of the length of labor, it had lasted less than 12 hours in 22, 12-24 hours in 7, and beyond 24 hours in only 1. Of the entire group of children, 15 had tumor and torticollis, 17 had tumor without torticollis, and 14 had torticollis without tumor, but in 3 of the last group either tumor or torticollis or both had been noted, but not treated, during the first 8 weeks of life. Myotomy was done on 11, tumor excision on 31, and the 4 patients not treated surgically were given corrective exercises. Cure was complete in 27 and moderate in 6 others; 13 others were lost to follow-up. Restoration was more complete and more rapid after early correction of torticollis, whereas long-standing asymmetry tended to persist.

No suggestion of neoplastic characteristics was found in the tissues removed and even unremoved remnants of involved tissue do not lead to recurrences. Avulsion, massive hematoma, and arterial occlusion could not be implicated, but pressure over an area of muscle might well cause ischemia in part of the vascular bed. An abnormal relationship between the fetal head and body would interfere with the blood supply and lead to muscle changes typical of hypoxia. Abnormal presentations (common in this series) increase the incidence of head malpositions, but extreme lateral inclinations occur even in vertex presentations. It seems more likely that abnormal delivery is in itself a symptom of a prenatal disturbance arising from uterine malposition and causing ischemia and muscular fibrosis. In children with subsequent torticollis, neonatal fibromas may well have missed detection because of their great size variation.

Early surgical correction—requiring only 2 days' hospitalization, involving only minimal risks, and producing excellent results—appears to be the treatment of choice.

HERNIA AS A CAUSE OF COLIC IN INFANCY

Colic—a symptom of paroxysmal abdominal pain—has been traced to an inguinal hernia in 11 "colicky" infants reviewed by Herman Schneck, M.D., and Sydney Leider, M.D., in the *New York Journal of Medicine,* May 15, 1955.

The causes of colic run the gamut from overfeeding or underfeeding to worm infestation, lead poisoning, and emotional disorders, but the organic causes commonly incriminated are appendicitis, intussusception, and volvulus. Rarely, if ever, has inguinal hernia been mentioned as a cause either in textbooks or in the literature. In the cases reviewed (5 are summarized), colic invariably subsided and never recurred after herniorrhaphy was performed. The importance of relating both the physician's and the parents' observations is stressed, for the mother may have noted a lump in the infant's groin during an attack, whereas the physician may find a completely relaxed inguinal ring. Intensive and lengthy crying appeared to signify repeated attacks of incarceration caused by the hernia. Some of the babies vomited during attacks. Any mass in the groin of a screaming infant calls for immediate attention. Any unexplained crying in early infancy should suggest possible inguinal hernia. Tracing the colic to a specific cause should serve to eliminate most diagnoses mentioning either "unexplained crying" or "idiopathic colic."

Alertness for possible inguinal hernia is emphasized because it is much commoner than either appendicitis or intussusception. The threat of incarceration diminishes as the infant reaches his sixth month, whereas appendicitis and intussusception are rare in the youngest babies but grow more common after the child passes his first half year of life. Mortality and morbidity rates for surgical correction are negligible.

All 11 babies were sent home the day after operation, and treatment for the next 3 or 4 days was limited to daily intramuscular injections of 300,000 units of penicillin. This type of regimen was believed to minimize unfavorable psychologic reactions in either the parents or the child, and certainly it avoided exposure to cross infection. Nursing care given by the mothers was probably more continuous and surely more personal than any a busy hospital could provide. Healing in each instance was perfect and uneventful.

THYROXINE THERAPY IN PREVENTIVE GERIATRICS

Subclinical hypothyroidism, its discovery and correction, are discussed by Paul Starr, M.D., as an important consideration in preventive geriatrics in *The Journal of The American Geriatrics Society,* April, 1955.

With the recent perfection of a dependable, economic, and direct method to measure concentrations of thyroxine (serum protein-bound iodine) circulating in the blood and thereby evaluate tissue activity and with the discovery of an inexpensive method of producing a chemically pure sodium levothyroxine from amino acids and iodide, it has become possible to diagnose and treat hypothyroidism more efficiently. It was once believed that the thyroid gland was unnecessary to human health after the fiftieth year, largely because aged people often had lower basal metabolic rates. However, their state of health and the level of thyroid function were not related. The absence of myxedema in the aged even after a total thyroidectomy seemed to support this view until tracer studies with radioactive iodine proved that total thyroid extirpation surgically was not possible. Measurements of thyroxine concentrations by several authorities among large groups of people of all ages suggested that normal concentrations of thyroid hormone were essential for normal tissue activity at all ages and that the need for adequate thyroid function continues, with scarcely any change, throughout life. It was found that hypothyroidism, which has long been known to be debilitating, tended to shorten life by giving rise to various degenerative diseases, among them atherosclerosis, responsible for morbidity and mortality.

Several charts, illustrating various studies of thyroid function, point up the importance of adequate hormone levels. But unquestionably the most spectacular evidence comes by way of the 97-year-old woman who was myxedematous from 1882 until 1894 when, at the age of 37, she began receiving thyroid therapy. Her intake of thyroid substance has been 1½ grains daily for the past 60 years and, whenever her physician has attempted to withdraw hormone therapy, her basal metabolic rate has fallen from minus 5 to minus 35 per cent.

Direct measurement of the circulating thyroid hormone in the middle-aged patient (serum protein-bound iodine) is recommended as a routine procedure. A serum protein-bound iodine value below 4.0 micrograms per 100 ml. serum is indicative of subnormal thyroid function and calls for substitution therapy, consisting of oral ingestion of sodium levothyroxine for the balance of the patient's life.

CITRIC ACID INTOXICATION

Studies conducted by John P. Bunker, M.D., *et al.* have clearly indicated that citric acid intoxication can and does occur after multiple transfusions of citrated blood are administered in instances of liver disease or mechanical obstruction to the hepatic circulation, but it is also noted in other patients who receive too rapid or too prolonged infusions of such blood. Observations on 130 unselected patients, given moderate to large quantities of citrated blood, were reported in *The Journal of the American Medical Association,* April 16, 1955.

The responses in this group were compared with those of another group, receiving more moderate transfusions. Careful blood analysis produced no citric acid intoxication in thirty-three normal adults given multiple transfusions at rates never exceeding 500 cc. every half hour after surgery. This suggested that as long as the citrate infused remained below 0.5 mg. per Kg. of body weight per minute, the serum ionized citrate level remained below 9 mg. per 100 ml. (0.5 mM. per liter) and the calculated level of ionized calcium remained above 0.85 mM. per liter. Serum citrate levels were higher among patients with advanced hepatic disease. As the serum citrate levels rose, ionized calcium values correspondingly fell, requiring correction of their level by intravenous administration of calcium chloride. At low rates of infusion, no correlation was noted between the total citrate infused and the serum citrate concentration. At higher rates of infusion (exceeding 1 mg. per Kg. per minute) the correlation was closer, the calculated level of ionized calcium falling clearly below normal range. Arriving at the proper therapeutic dose of calcium chloride proved extremely difficult, because of the wide variation in rates at which infused calcium diffuses for redistribution and use from the vascular compartment into the extracellular fluid space. Only rarely did potassium values rise to 5.5 mEq. per liter and never over 5.7 mEq., thereby eliminating additional hazards from that source.

Although hypotension and coagulation difficulties could not be attributed entirely or even partly to elevated citric acid levels, the response of hypotensive patients to intravenous calcium therapy was always prompt, whereas hypotensive patients not given supplemental calcium persisted in the hypotensive state despite adequate blood replacement. The most serious threat from infused citrate is profound vascular collapse and death.

Treating citric acid intoxication by administering calcium salts was not always satisfactory, because accurate predictions of elevated citrate values were as difficult to make as were attempts to estimate how high a given amount of injected calcium chloride would raise the calcium values of the serum. To avoid the hazards of calcium overdosage and clotting, the authors recommend the use of decalcified blood whenever citrate intoxi-

cation threatens. Blood is decalcified by passing it across a cation exchange resin, which replaces the serum calcium with a sodium ion. Then the accurate correction of the calcium ion deficiency is feasible. Or, the use of packed or resuspended red blood cells would be another way of cutting down the dangers of transfusion.

DECIDUAL REACTION OF THE CERVIX

William Buster McGee, M.D., and Thomas A. Slate, M.D., describe the tissue changes characterizing decidual reaction of the cervix on the basis of studies made of 27 pregnant women. Their account of this benign growth of unknown origin appeared in *California Medicine,* April, 1955.

Evidence of decidual reaction is found in 20 per cent of all biopsy specimens taken from the cervical area during pregnancy. The hormones liberated during pregnancy may be responsible for the changes, which are often misdiagnosed as anaplastic carcinoma although differentiation is not difficult. The spotting and bleeding which it causes must, during the first trimester, be differentiated from the bleeding of impending abortion or extrauterine pregnancy and, during the third trimester, from placenta previa and abruptio placentae.

The lesion may be a sessile polyp or an endocervical polyp with pedicle; a rimlike tumefaction all or partly around the os at the columnar squamous junction; a granular proliferative papillary or fungating mass on one or both lips around the external os; a single (or several) pearly, shiny, gray to yellow tumor on the cervical or vaginal mucosa; or hypertrophic erosion, distinguishable from the erosion of pregnancy only by its more ready bleeding on palpation.

The authors describe the tissue changes, and several illustrations show the structure in specimens taken for biopsy. Nineteen of their 27 pregnant patients with decidual reaction of the cervix also had erosion or endocervicitis. In 8, except for isolated decidual lesions, the cervix was clean. Endometriosis could be confirmed in only 1. Another patient had a hypertrophic cervix with extensive multiple deciduomas on the cervical mucosa and the vaginal vault. Biopsy was performed antenatally (5-6 weeks from the last menstrual period), at term, and postpartum. In each case, the lesion had disappeared by the sixth week postpartum. Of 4 abortions, 3 were spontaneous and 1 induced; 1 ectopic pregnancy ruptured. Premature deliveries occurred spontaneously in 2 and due to abruptio placentae in a third.

Decidual reactions should be treated conservatively. Endocervical polyps are twisted off with a clamp and, if necessary, lightly cauterized at the base. Gelfoam will control bleeding. The Papanicolaou study of material obtained by wooden spatula from the lesion will not disclose decidual reaction, but will give a negative picture for malignancy.

POSTMASTECTOMY LYMPHEDEMA

Roy P. Villasor, M.D., and Edward F. Lewison, M.D., discuss the causes and prevention of lymphedema of the arm after radical mastectomy in *Surgery, Gynecology and Obstetrics,* June, 1955.

Lymphedema in 50 patients after radical mastectomy and in 1 patient after extended radical mastectomy was classified at the Breast Clinic, John Hopkins Hospital, as slight in 33.3, moderate in 27.5, and severe in 39.2 per cent. Onset was immediately after surgery in 64.7 per cent (two thirds of this group experiencing no pain, discomfort, or numbness); undiscerned by the patient herself in 5.9; and delayed in 29.3 per cent of the group.

Swelling was unrelated to either persistent or recurrent cancer. Of the lymphedematous patients, 45 per cent complained of impaired arm function, but the degrees of dysfunction and of lymphedema could not be related any more than could the disability and the symptoms of pain, numbness, or discomfort. Moderate obesity tended to be coupled with more pronounced swelling. Edema seemed to be more common in the least predominant arm. It was also more common after radiotherapy which, however, was administered only for more advanced disease and metastases to the axilla. Type of closure—skin graft or per primam—had little bearing, but poorly placed incisions, extending into the axilla or to the arm and tight or binding scars appeared to contribute to swelling. Neither wound drainage or aspiration nor concurrent diabetes or cardiovascular disease could be implicated, but infection appeared to invite swelling. Lymphedema was more common when surgical intervention extended into the clavicular head of the pectoralis major muscle. Although early mobilization failed to prevent swelling, late mobilization resulted in limited arm motion among two thirds of the patients so treated.

Although no common causative factor emerges, preventive measures would include the avoidance of infection, of all homolateral arm injections, axillary vein damage, surgical encroachment of the clavicular head of the pectoralis major muscle, the axilla, or the arm, and radiation damage to the skin. Dissection into the axillary region should be meticulous and sharp, mobilization of the arm early but not overtaxing or abusive, and postoperative management of the arm should include dressing with elastic bandage or sleeve and elevation. The weight of obese patients should be reduced.

FURTHER EXPERIENCE WITH LONG-TERM ANTICOAGULANT THERAPY

The effects of continuous anticoagulant therapy in the long-term management of rheumatic heart disease and recurrent embolism have been observed in approximately 300 patients by William T. Foley, M.D., *et al.* They originally reported, in 1949, on 19 patients so treated, and now review experience with 85 others, treated for 1 to 8 years (3,552 patient-months), in *A.M.A. Archives of Internal Medicine,* April, 1955.

This study includes patients with embolic episodes accompanying heart disease, recurrent thrombophlebitis with or without pulmonary emboli, myocardial infarction, and a group with thromboembolic complications accompanying miscellaneous disorders. All could be relied upon to observe instructions during therapy. Most were hospitalized before anticoagulants were administered.

For immediate response, heparin with ethyl biscoumacetate or bishydroxycoumarin, or both, was used until prothrombin time reached 25-35 seconds. Thereafter, doses were based on daily prothrombin counts. When the patient left the hospital, weekly counts usually sufficed. Dosages varied from patient to patient (25-100 mg.) but remained relatively constant for any one of them. Sometimes infections, diarrhea, antibiotic therapy, or altered food or alcohol intake reduced anticoagulant requirements.

Throughout the 3,552 patient-months of therapy, hemorrhagic complications, most of them mild, were noted 31 times among the 85 patients. One person died of cerebral hemorrhage. Usually the hemorrhages required withdrawal of anticoagulants only until the prothrombin time returned to a safe level. Treatment with vitamin K or vitamin K_1 was given on 19 occasions. Observation of the group for 3,673 patient-months before anticoagulant therapy began made it possible to compare the 31 hemorrhagic episodes with the 290 recorded before treatment began.

Of the series, 53 patients continue taking anticoagulants, 14 have discontinued treatment for various reasons, and 18 (15 of them under treatment) died. The terminal illness usually followed the pattern of the disease under treatment.

Anticoagulant therapy decidedly diminishes thromboembolic episodes among patients with rheumatic disease or recurrent thrombophlebitis, reducing the incidence of clot formation and, thereby, the number of embolic accidents. The treatment is well tolerated, even though it does not always ward off death, particularly if the primary disease is severe.

Book Notices

PERIPHERAL VASCULAR DISEASES. By Edgar V. Allen, B.S., M.A., M.D., M.S. in Medicine, F.A.C.P., Section of Medicine, Mayo Clinic; Professor of Medicine, Mayo Foundation, Graduate School, University of Minnesota; Diplomate of the American Board of Internal Medicine; Nelson W. Barker, B.A., M.D., M.S. in Medicine, F.A.C.P., Section of Medicine, Mayo Clinic; Professor of Medicine, Mayo Foundation, Graduate School, University of Minnesota; Diplomate of the American Board of Internal Medicine; and Edgar A. Hines, Jr., B.S., M.A., M.D., M.S. in Medicine, F.A.C.P., Section of Medicine, Mayo Clinic; Professor of Medicine, Mayo Foundation, Graduate School, University of Minnesota. Ed. 2. Cloth. Pp. 825, with illustrations. Price $13.00. W. B. Saunders Company, West Washington Square, Philadelphia 5, 1955.

This important book is essentially a compilation of what has been learned about the peripheral vascular diseases by physicians and surgeons working in that field at the Mayo Clinic. Many of the conditions described are truly rare, and many others appear to be rare, but the disquieting suspicion grows on the reader that they are not really so much rare as undiagnosed. Ably written and well documented, the pitfalls of drawing too many conclusions from too little evidence are neatly circumvented. The sections on etiology, pathology, and pathologic physiology are readable without the reader getting the sensation that he often gets in scientific literature that he is hewing his way through the jungles of the Amazon with a machete. This book is invaluable to physicians whose understanding of peripheral vascular diseases could stand some amplifying, which includes most of us. Many of the sections on treatment are very short and not too specific, but in most cases the details of the treatment are easily available elsewhere. It is a book which could profitably be included in almost every physician's or surgeon's library, but the practitioner who attempts to use it as a ready reference for treatment will be disappointed.

LESIONS OF THE LUMBAR INTERVERTEBRAL DISC. With Special Reference to Rupture of the Annulus Fibrosus with Herniation of the Nucleus Pulposus. By R. Glen Spurling, M.D., Clinical Professor of Surgery (Neurosurgery), University of Louisville School of Medicine, Louisville, Ky. Cloth. Pp. 148, with illustrations. Price $4.75. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1953.

Osteopathic physicians in general as well as specialists in orthopedics and neurosurgery will be most interested in this monograph written to present a practical account of the lumbar intervertebral disk and the pathologic processes which may occur in it. Following a discussion of the history of the lesion and embryologic and anatomic considerations, the author, whose oneness of thought reflects his excellent background experience in, and knowledge of, the problem, pursues his main objectives correlating the pertinent anatomic, physiologic, and pathologic aspects of disk lesions with their clinical aspects and outlining their management. The author concludes with a discussion of conservative and surgical therapy and an evaluation of their management. The appended list of references and the well-organized subject index indicate that considerable research and thought went into the preparation of the monograph. Not only the style, which is clear and candid, but the excellent physical make-up of the book make for rapid reading and reference.

THE DIGITAL CIRCULATION. By Milton Mendlowitz, M.D., F.A.C.P., Associate Attending Physician, Mount Sinai Hospital; Research Fellow, Columbia University Division of Goldwater Memorial Hospital, New York City. Cloth. Pp. 182, with illustrations. Price $6.75. Grune & Stratton, 381 Fourth Avenue, New York 16, 1954.

This book probably represents at least the penultimate, if not ultimate, extreme to which specialization may logically be carried. It is more practical and less limited than its title suggests. Part of its value may be allied to a part of the value of retinoscopy, namely,

> . . . when properly studied, the digital circulation may mirror changes that take place in the systemic circulation as a whole; second, changes in the peripheral blood vessels, whether structural or functional, are very often manifest to the greatest degree in the acral parts of the circulation. . . .

With peripheral vascular diseases coming ever more to the fore as important considerations, much of the material in this volume is more pertinent than anyone would have thought possible a few years ago. There is a very fine section on anatomy and physiology which will be of value to the man who does any important amount of accident work, for it may present the little extra information which will enable him to skirt disaster and achieve good results in some of the perplexing difficulties involved in injuries to the extremities.

TEXTBOOK OF THE NERVOUS SYSTEM. A Foundation for Clinical Neurology. By H. Chandler Elliott, M.A., Ph.D., Associate Professor of Anatomy, College of Medicine, University of Nebraska. Cloth. Pp. 437, with illustrations and an atlas. Price $9.00. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1954.

Here is the first treatise on the anatomy of the nervous system which this reviewer has ever seen that he could read easily with understanding. Step by step it takes the student through the maze of neurology, beginning with the basic cell and working up to the more complex features. As a reference book for the location of specific detail it is not likely to be the equal of the "standard" works on the subject, but as a textbook and teaching aid, this reviewer considers it to be without parallel. It is divided into three basic sections. Part I gives a basic, diagrammatic, nondetailed picture of the nervous system with a minimum of embryology. No attempt is made to picture the true anatomic relationships at this point. Part II adds more detail, but its approach is still largely diagrammatic. The third part is the Atlas which goes into a discussion of the actual brain form. There are numerous diagrams which are well drawn and well explained and which are pertinent to the text. Generally speaking, the actual photographs in the Atlas are accompanied by diagrams on the facing page, which anyone who has struggled with photographs of brain sections will recognize as a good thing. This book should be a tremendous help to the student who is bewildered by the enormous problem of grasping the three-dimensional intricacies of the nervous system's anatomy.

HANDBOOK OF EMERGENCY TOXICOLOGY. By Sidney Kaye, B.S., M.Sc., Toxicologist, Office of the Chief Medical Examiner, Commonwealth of Virginia; Associate Professor of Legal-Medicine, Medical College of Virginia; Attending Toxicologist, Veteran's Administration Hospital, Richmond, Virginia; Lt. Colonel United States Army Reserve; Toxicologist, Research and Development Group (Tng.); Lecturer in Legal-Medicine, University of Virginia, Department of Medicine; Formerly Toxicologist, St. Louis Police Department; Toxicologist, United States Army Medical Department; Instructor in Pathology, Washington University School of Medicine; Research Assistant, Toxicology Laboratories of the Chief Medical Examiner, City of New York. Cloth. Pp. 282, with illustrations. Price $5.75. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1954.

The chief value of this book consists in its gathering together of miscellaneous information which is ordinarily widely scattered and frequently difficult of access. A section concerning commercial sources of poisoning and poisonous ingredients of common household articles is included which is of considerable value, but which would have been of more value if it had been made more specific. For instance, listing Cleaning Solutions as one group and indiscriminately including in it such diverse items as alkalies, ammonia water (which, after all, is an alkali), carbon tetrachloride, nitric acid, sulfuric acid, and cyanides is not particularly helpful and may be downright confusing. Sections concerning treatment are fairly good, but vague (probably unavoidable). There was also a tendency to

mix treatment, admonitions, and contraindications without differentiation in the treatment sections. The general format of the book leaves much to be desired from the standpoint of clarity, and the writing is uneven. However, with all its faults, the very act of assembling this information into one volume makes this book one of some value to the practicing physician.

Current Concepts in DIGITALIS THERAPY. By Bernard Lown, M.D., Formerly Assistant in Medicine, Peter Bent Brigham Hospital; and Samuel A. Levine, M.D., Clinical Professor of Medicine, Harvard Medical School; Physician, Peter Bent Brigham Hospital. Cloth. Pp. 164, with illustrations. Price $3.50. Little, Brown & Co., Boston, 1954.

This is an inexpensive and practical guide to the use of digitalis, either as the leaf or in the form of derivatives. The subject is admittedly limited, but important. Sufficient detail is given to make the use of the book practical, but it is not so detailed that its use becomes impractical. An interesting and potentially valuable digitalis tolerance test is included that may be of singular help in cases where the clinical picture is confused.

MAN ABOVE HUMANITY. A History of Psychotherapy. By Walter Bromberg, B.S., M.D. Cloth. Pp. 342. Price $5.75. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1954.

Dr. Bromberg has written a fascinating history of psychotherapy as it was and is understood in the western world. Refreshingly written and well documented, it is literature in the sense that scientific literature often is not: it is eminently readable, and this reviewer found that once started it is difficult to lay aside. For the physician who wishes to understand the basic background of psychotherapy, it is of great value. Several intriguing and too seldom appreciated avenues of thought are ably explored, including some interesting insights into that curious frenzy which seems to have characterized the medieval mind. At first blush the title appears to be arrogant and presumptuous, but the book is neither, and the title is justified. It is not a book of specific diagnosis and therapy.

BLOOD GROUPS IN MAN. By R. R. Race, Ph.D. (Cambridge), M.R.C.S. (England), F.R.S., Director, Medical Research Council Blood Group Research Unit, The Lister Institute, London; and Ruth Sanger, Ph.D. (London), B.Sc. (Sydney), Medical Research Council Blood Group Research Unit, The Lister Institute, London. Ed. 2. Cloth. Pp. 400, with illustrations. Price $7.50. Charles C Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill., 1954.

This is the second edition, occasioned by advances made since the appearance of the first edition in 1950. A notable addition is the inclusion of a ninth system of blood grouping, and Kidd groups. Unquestionably, this is an important publication and deserves a place in the hospital and laboratory library.

NEUROLOGY. Vols. 1, 2, and 3. By S. A. Kinnier Wilson, M.A., M.D., D.Sc. (Edin.), F.R.C.P., Formerly Physician, National Hospital, Queen Square; Senior Neurologist, King's College Hospital; Consulting Neurologist, Metropolitan Asylums Board (L.C.C.); Officier de l'Instruction Publique, R.F.; Honorary Fellow, Royal Academy of Medicine, Turin; Honorary Member, Royal Academy of Medicine, Belgium, National Academy of Medicine, Rio De Janeiro, Neurological Societies of Italy, Poland, Denmark, Holland, Brazil, Paris, Vienna, New York and Philadelphia, The Japanese Association of Psychiatry and Neurology, The Society of German Neurologists, The Medical Society of Copenhagen and the American Neurological Association; Corresponding Member, Neurological Society of Warsaw. Ed. 2. Cloth. Pp. 2060, with illustrations. Price $37.50. The Williams & Wilkins Company, Mount Royal & Guilford Aves., Baltimore 2, 1955.

This is a three-volume work dealing extensively and exhaustively with the diseases of the nervous system. Inasmuch as the writer practices in Great Britain, there are some uses of terminology and trade names of medications which may be confusing to readers in the United States, but on the whole the writing is well done and the subject interestingly presented. Each entity considered is well developed, with a wealth of background material in physiology, pathology, and other pertinent fields. The conditions dealt with are arranged by their known or presumptive etiologies, which has admitted advantages in tidiness of presentation. Unfortunately, the physician sees his cases in the office or hospital "arranged" by symptoms and objective findings, so that etiologic classification can present serious difficulties in finding the material needed. However, the authors have succeeded quite well in tying the material together so that this is prevented from becoming a major difficulty. It appears to this reviewer that any information which has been omitted from a work as encyclopedic as this one is probably too obscure to be of any practical value in any case.

COLOR ATLAS OF PATHOLOGY. Endocrine System, Including Pituitary, Thyroid, Parathyroid, Adrenals and Pancreas; Gynecology and Obstetrics, Including Reproductive Organs; Breasts; Male Genital Tract; Skin. Prepared under the auspices of the U.S. Naval Medical School of the National Naval Medical Center, Bethesda, Maryland. Cloth. Pp. 450, with illustrations. Price $20.00. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1954.

This is the second volume in a series of three volumes prepared from the voluminous material available in the National Naval Medical Center in Bethesda, Maryland. Like the first volume, it is of primary interest to pathologists and others with a more than average interest in pathology. In this volume will be found sections on the endocrine system, reproductive organs, obstetrics, and the skin. Technically, the book is superb. The color printing is among the best that this reviewer has ever seen anywhere, and the volume is well indexed. Those concerned with the production of this book may well congratulate themselves on the achievement of a masterpiece.

LABORATORY AIDS IN ENDOCRINE DIAGNOSIS. By Roberto F. Escamilla, M.D., Associate Clinical Professor of Medicine, University of California Medical School, San Francisco, California. Cloth. Pp. 131. Price $4.75. Charles C Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill., 1954.

This excellent little book is extremely limited in scope, as its title suggests, but what it does it does quite well. The laboratory procedures listed include radiographic and electrocardiographic studies. Only tests of known value or definite promise are included, and no attempt has been made to include those which are presently in the research stage. Many of the tests are given in sufficient detail that it should be possible to use the book as a laboratory manual. Interpretations are given for each test, and where the results may be equivocal this is noted. The book is arranged according to the type of test to be considered, with a section in the back for cross reference by disease, with an evaluation of the importance of each test for the disease in question. As a part of a hospital, laboratory, or specialist's library this publication could be of great value. It is doubtful if it will be of great direct interest to the general practitioner unless he is particularly interested in endocrinology and laboratory diagnosis.

CORRECTION

In the article, "Osteoporosis," by Solomon Gerber, D.O., published in the June JOURNAL, an error occurred in line 3, column 2, page 614. The dose for Premarin should have read one tablet (1.25 mg.) three times a day. We regret the error.